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ESL-IM369

RADIO RECEIVER R-5076/U

INSTRUCTION MANUAL

MARCH 1983

INTRODUCTION

This equipment manual provides sufficient information for first-line and second-line maintenance. This will allow the technician to install, operate, and maintain the Radio Receiver R-5076/U.

This manual is divided into the following sections:

SECTION I	General Description
SECTION II	Preparation for Use
SECTION III	Operation
SECTION IV	Theory of Operation
SECTION V	Maintenance
SECTION VI	Parts List
APPENDIX A	Integrated Circuit Data
APPENDIX B	Alternate Performance Test
APPENDIX C	Test Cable Fabrication Information
FOLDOUT DRAWINGS	

Various NOTES, CAUTIONS, and WARNINGS are used throughout this manual and are defined as follows:

NOTE

Operating procedure, condition, etc., which it is essential to highlight.

CAUTION

Operating procedures, practices, etc., which, if not strictly observed, will result in damage to, or destruction of, equipment.

WARNING

Operating procedures, practices, etc., which will result in personal injury or loss of life if not correctly followed.

TABLE OF CONTENTS

Section		Page
I.	GENERAL DESCRIPTION	
1.1	General	1-1
1.2	Equipment Supplied.	1-1
1.3	Electrical Specifications	1-3
1.4	Mechanical Specifications	1-3
II.	PREPARATION FOR USE	
2.1	Unpacking and Inspection.	2-1
2.2	Installation.	2-1
III.	OPERATION	
3.1	General	3-1
3.2	Controls and Indicators	3-1
3.3	Operating Procedures.	3-1
IV.	THEORY OF OPERATION	
4.1	General	4-1
4.2	Functional Description.	4-1
4.2.1	Front End ECA A1.	4-1
4.2.1.1	RF Preselect CCA A1A1	4-1
4.2.1.2	Local Oscillator CCA A1A2	4-2
4.2.1.3	First Mixer IF CCA A1A3	4-3
4.2.1.4	Test Source CCA A1A4.	4-3
4.2.2	Synthesizer ECA A2.	4-3
4.2.2.1	Synthesizer CCA A2A1.	4-3
4.2.2.2	Decoder CCA A2A2.	4-4
4.2.3	First and Second IF Amplifier/Detector ECA A3	4-4
4.2.3.1	First IF Amplifier/Detector CCA A3A1.	4-4
4.2.3.2	Second IF Amplifier/Detector CCA A3A2	4-4
4.2.4	Single-Sideband (SSB) Adapter ECA A4.	4-4
4.3	Detailed Theory of Operation.	4-6
4.3.1	Front End ECA A1.	4-6
4.3.1.1	RF Preselect CCA A1A1	4-6
4.3.1.2	Local Oscillator CCA A1A2	4-8
4.3.1.3	First Mixer IF CCA A1A3	4-8
4.3.1.4	Test Source CCA A1A4.	4-10
4.3.2	Synthesizer ECA A2.	4-12
4.3.2.1	Synthesizer CCA A2A1.	4-12
4.3.2.2	Decoder CCA A2A2.	4-19
4.3.3	First and Second IF Amplifier/Detector ECA A3	4-23
4.3.3.1	First IF Amplifier CCA A3A1	4-23
4.3.3.2	Second IF Amplifier/Detector CCA A3A2	4-25
4.3.4	Single-Sideband (SSB) Adapter ECA A4.	4-31
4.3.4.1	SSB CCA A4A1.	4-31
V.	MAINTENANCE	
5.1	General	5-1
5.2	Test Equipment Required	5-1

TABLE OF CONTENTS - Continued

Section		Page
5.3	Preventive Maintenance.	5-2
5.3.1	Daily Preventive Maintenance.	5-2
5.3.2	Weekly Preventive Maintenance	5-2
5.3.3	Monthly Preventive Maintenance.	5-2
5.4	Operational Test.	5-2
5.5	Performance Test.	5-2
5.6	Disassembly and Assembly.	5-74
5.6.1	Disassembly	5-74
5.6.2	Assembly.	5-77
5.7	Alignment and Adjustment.	5-79
5.7.1	Subassembly Adjustment.	5-80
5.7.1.1	RF Preselect CCA A1A1	5-80
5.7.1.2	Local Oscillator CCA A1A2	5-92
5.7.1.3	Test Source CCA A1A4.	5-104
5.7.1.4	Decoder CCA A2A2.	5-104
5.7.1.5	First and Second IF Amplifier/Detector ECA A3 . . .	5-108
5.7.1.6	Single-Sideband (SSB) Adapter ECA A4.	5-118
5.7.2	Final Adjustment and Testing.	5-120
VI.	PARTS LIST	
6.1	General	6-1
6.2	Vendor Codes.	6-1
6.3	Parts List.	6-3
APPENDIX A.	INTEGRATED CIRCUIT DATA.	A-1
APPENDIX B.	ALTERNATE PERFORMANCE TEST	B-1
APPENDIX C.	TEST CABLE FABRICATION INFORMATION	C-1

LIST OF ILLUSTRATIONS

Figure		Page
	Frontispiece: Radio Receiver R-5076/U.	1-0
3-1	Radio Receiver R-5076/U Controls.	3-2
4-1	Radio Receiver R-5076/U Simplified Block Diagram. .	4-2
4-2	RF Preselect CCA A1A1 Block Diagram	4-7
4-3	Local Oscillator CCA A1A2 Block Diagram	4-9
4-4	First Mixer IF CCA A1A3 Block Diagram	4-10
4-5	Test Source CCA A1A4 Block Diagram.	4-11
4-6	Test Source Output.	4-11
4-7	Synthesizer CCA A2A1 Block Diagram.	4-14
4-8	Substrate Assembly A2A1A1 (IELOB-01).	4-16
4-9	Loop Amplifier CCA A2A1A2	4-20
4-10	Decoder CCA A2A2 Block Diagram.	4-21
4-11	Substrate Assembly A2A2A1 (CAM-02).	4-22
4-12	30-MHz Down Converter and First-Stage IF Amplifier CCA A3A1 Block Diagram.	4-24
4-13	IF Filters, Second-Stage IF, and Third-Stage IF Amplifier Block Diagram	4-26
4-14	Second IF Amplifier/Detector CCA A3A2 Block Diagram	4-28
4-15	MGC/AGC, ALC, Tuning Indicator, Squelch, and Audio Output Circuitry.	4-29
4-16	CW Detector Block Diagram	4-30
4-17	Single-Sideband CCA A4A1 Block Diagram.	4-32
5-1	Operation Test Setup.	5-11
5-2	Performance Test Equipment Setup.	5-12
5-3	First and Second IF Amplifier/Detector ECA A3 Test Point Locations.	5-71
5-4	Front End ECA A1 Test Point Locations	5-73
5-5	Radio Receiver R-5076/U Subassembly Locations . . .	5-75
5-6	RF Preselect CCA A1A1 Adjustment Setup.	5-82
5-7	RF Preselect CCA A1A1 Adjustment Locations.	5-85
5-8	RF Preselect CCA A1A1 Response Curves	5-87
5-9	Front End/Frequency Response.	5-89
5-10	LO CCA A1A2 Preliminary Adjustment Setup.	5-97
5-11	Local Oscillator CCA A1A2 Adjustment Locations. . .	5-99
5-12	LO Tracking Adjustment Setup.	5-101
5-13	LO Tracking Adjustment Spectrum Analyzer Displays .	5-102
5-14	Test Source CCA A1A4 Adjustment Setup	5-105
5-15	Test Source CCA A1A4 Adjustment Locations	5-106
5-16	Test Source Subassembly A1A4 Frequency Spectrum (J2) Output.	5-107
5-17	Synthesizer ECA A2 Adjustment Setup	5-108
5-18	Decoder CCA A2A2 Adjustment Locations	5-109
5-19	First and Second IF Amplifier/Detector ECA A3 Adjustment Setup.	5-110
5-20	First and Second IF Amplifier/Detector ECA A3 Adjustment Locations.	5-112

LIST OF ILLUSTRATIONS - Continued

Figure		Page
5-21	Bandpass Display Example.	5-115
5-22	First IF Amplifier/Detector ECA A3 30-MHz BPF Adjustment Setup.	5-118
5-23	SSB ECA A4 10.7-MHz Notch Filter Adjustment Setup .	5-119
5-24	Receiver SSB Adapter ECA A4 Adjustment Locations. .	5-121
5-25	Receiver SSA Adapter CCA A4A1 10.7-MHz Notch Filter Display	5-122
5-26	Radio Receiver R-5076/U Final Adjustment Setup. . .	5-123
5-27	Radio Receiver R-5076/U Final Adjustment Locations.	5-124
6-1	Radio Receiver R-5076/U	6-4
6-2	Front End ECA A1.	6-7
6-3	RF Preselect CCA A1A1	6-9
6-4	Local Oscillator CCA A1A2	6-12
6-5	First Mixer IF CCA A1A3	6-16
6-6	Test Source CCA A1A4.	6-18
6-7	Special Purpose Front End Cable Assembly A1W1 . . .	6-22
6-8	Synthesizer ECA A2.	6-24
6-9	Synthesizer CCA A2A1.	6-26
6-10	Loop Amplifier CCA A2A1A2	6-30
6-11	Decoder CCA A2A2.	6-32
6-12	Substrate Assembly A2A2A1	6-35
6-13	Special Purpose Cable Assembly A2W1	6-37
6-14	First and Second IF Amplifier/Detector ECA A3 . . .	6-39
6-15	First IF Amplifier/Detector CCA A3A1.	6-41
6-16	Second IF Amplifier/Detector CCA A3A2	6-46
6-17	Special Purpose Cable Assembly A3W1	6-53
6-18	Single-Sideband Adapter ECA A4.	6-55
6-19	Single-Sideband CCA A4A1.	6-57
6-20	Special Purpose Cable Assembly A4W1	6-61
6-21	RF Cable Assembly W1.	6-63
6-22	RF Cable Assembly W2.	6-65
6-23	RF Cable Assembly W3.	6-67
6-24	RF Cable Assembly W4.	6-69
6-25	RF Cable Assembly W5.	6-71
6-26	RF Cable Assembly W6.	6-73
6-27	RF Cable Assemblies W7 and W8	6-75
B-1	Performance Test Equipment Setup.	B-43
B-2	First and Second IF Amplifier/Detector ECA A3 Test Point Locations.	B-44
B-3	Front End ECA A1 Test Point Locations	B-46
B-4	RF Preselect CCA A1A1 Adjustment Setup.	B-49
B-5	RF Preselect CCA A1A1 Adjustment Locations.	B-51
B-6	RF Preselect CCA A1A1 Response Curves	B-54
B-7	Front End Frequency Response.	B-56
B-8	LO CCA A1A2 Preliminary Adjustment Setup.	B-64
B-9	Local Oscillator CCA A1A2 Adjustment Locations. . .	B-66
B-10	LO Tracking Adjustment Setup.	B-69
B-11	LO Tracking Adjustment Spectrum Analyzer Displays .	B-69

LIST OF ILLUSTRATIONS - Continued

Figure		Page
B-12	First and Second IF Amplifier/Detector ECA A3 Adjustment Setup.	B-72
B-13	First and Second IF Amplifier/Detector ECA A3 Adjustment Locations.	B-74
B-14	Bandpass Display Example.	B-77
B-15	SSB ECA A4 10.7-MHz Notch Filter Adjustment Setup .	B-79
B-16	SSB Adapter ECA A4 Adjustment Locations	B-81
B-17	SSB Adapter CCA A4A1 10.7-MHz Notch Filter Display.	B-82
B-18	Radio Receiver R-5076/U Final Adjustment Setup. . .	B-84
B-19	Radio Receiver R-5076/U Final Adjustment Locations.	B-85
C-1	Test Cable No. 1.	C-2
C-2	Test Fixture.	C-2
FO-1	Radio Receiver R-5076/U Functional Block Diagram	
FO-2	Radio Receiver R-5076/U Wiring Diagram	
FO-3	RF Preselect CCA A1A1 Schematic Diagram	
FO-4	Local Oscillator CCA A1A2 Schematic Diagram	
FO-5	First Mixer IF CCA A1A3 Schematic Diagram	
FO-6	Test Source CCA A1A4 Schematic Diagram	
FO-7	Synthesizer CCA A2A1 Schematic Diagram	
FO-8	Loop Amplifier CCA A2A1A2 Schematic Diagram	
FO-9	Decoder CCA A2A2 Schematic Diagram	
FO-10	First IF Amplifier/Detector CCA A3A1 Schematic Diagram	
FO-11	Second IF Amplifier/Detector CCA A3A2 Schematic Diagram	
FO-12	Single-Sideband CCA A4A1 Schematic Diagram	

LIST OF TABLES

Table		Page
1-1	Power and Signal Connections.	1-2
1-2	Electrical Specifications	1-4
1-3	Mechanical Specifications	1-6
3-1	R-5076/U Controls	3-1
4-1	Command Bit Assignments	4-13
4-2	Truth Table for Band Decoder PROM U4.	4-18
5-1	Test Equipment Required	5-1
5-2	Daily Preventive Maintenance Checks and Services. .	5-3
5-3	Weekly Preventive Maintenance Checks and Services .	5-3
5-4	Monthly Preventive Maintenance Checks and Services.	5-4
5-5	Radio Receiver R-5076/U Operational Test.	5-5
5-6	Radio Receiver R-5076/U Performance Test.	5-13
6-1	Radio Receiver R-5076/U	6-6
6-2	Front End ECA A1.	6-8
6-3	RF Preselect CCA A1A1	6-10
6-4	Local Oscillator CCA A1A2	6-13
6-5	First Mixer IF CCA A1A3	6-17
6-6	Test Source CCA A1A4.	6-19
6-7	Special Purpose Front End Assembly A1W1	6-23
6-8	Synthesizer ECA A2.	6-25
6-9	Synthesizer CCA A2A1.	6-27
6-10	Loop Amplifier CCA A2A1A2	6-31
6-11	Decoder CCA A2A2.	6-33
6-12	Substrate Assembly A2A2A1	6-36
6-13	Special Purpose Cable Assembly A2W1	6-38
6-14	First and Second IF Amplifier/Detector ECA A3 . . .	6-40
6-15	First IF Amplifier/Detector CCA A3A1.	6-43
6-16	Second IF Amplifier/Detector CCA A3A2	6-48
6-17	Special Purpose Cable Assembly A3W1	6-54
6-18	Single-Sideband Adapter ECA A4.	6-56
6-19	Single-Sideband CCA A4A1.	6-58
6-20	Special Purpose Cable Assembly A4W1	6-62
6-21	RF Cable Assembly W1.	6-64
6-22	RF Cable Assembly W2.	6-66
6-23	RF Cable Assembly W3.	6-68
6-24	RF Cable Assembly W4.	6-70
6-25	RF Cable Assembly W5.	6-72
6-26	RF Cable Assembly W6.	6-74
6-27	RF Cable Assemblies W7 and W8	6-76
B-1	Radio Receiver R-5076/U Alternate Performance Test.	B-2

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Radio Receiver R-5076/U

SECTION I

GENERAL DESCRIPTION

1.1 GENERAL.

Radio Receiver R-5076/U Part Number 10-129347, hereinafter referred to as the R-5076/U, provides VHF reception in the 20- to 149.999-MHz frequency range. Tuning accuracy is controlled by a phase-locked loop. Four bands are used to provide amplitude modulation (AM), frequency modulation (FM), or continuous wave (CW), and single-sideband (SSB) reception. The R-5076/U is designed for a system that supplies a digital command word to control operation. The data word is decoded by the receiver to perform band changing and bandwidth selection, frequency tuning, intermediate frequency (IF) selection, automatic gain control (AGC) or manual gain control (MGC) selection, automatic level control (ALC), and squelch control. See figure FO-1 for overall system block diagram.

1.2 EQUIPMENT SUPPLIED.

The R-5076/U comprises three separate electronic component assemblies (ECAs). The ECAs, which consist of one or more circuit card assemblies (CCAs), are mounted back-to-back on two chassis and enclosed in an air transport regulation (ATR) case. The ECAs and their associated CCAs are as follows:

a. Front End ECA A1

(1) RF preselect CCA A1A1
(2) Local oscillator CCA A1A2
(3) First mixer IF CCA A1A3
(4) Test source CCA A1A4.

b. Synthesizer ECA A2

(1) Synthesizer CCA A2A1
(2) Decoder CCA A2A2.

c. First and Second IF Amplifier/Detector ECA A3

(1) First IF amplifier/detector CCA A3A1
(2) Second IF amplifier/detector CCA A3A2.

External equipment required to operate the R-5076/U is not supplied with the receiver. Cable connections that provide input power and signal interconnections are provided by two front panel multipin connectors J1 and J2. Table 1-1 lists the connector pins together with the signal names. Jack J3 is a headset connector for monitoring detected audio. SMA connector J4 enables connection of the RF input cable. SMA connector J5 is not used, but provides an IF (10.7-MHz or 30-MHz) output.

Table 1-1. Power and Signal Connections

Origin Connector Reference Designator	Pin	Function/Remarks
J1	1	+15 V dc
J1	2	-15 V dc
J1	3	+5 V dc
J1	4	+5 V dc
J1	5	+5 V dc
J1	6	+36 V dc
J1	7	GND
J1	8	GND
J1	9	GND
J1	10	SDU SW IN
J1	11	CLK IN
J1	12	CLK RTN
J1	13	DATA IN
J1	14	DATA IN RTN
J1	15	LOAD IN
J1	16	LOAD IN RTN
J1	19	SPARE BIT 42
J1	20	SPARE BIT 43
J1	26	SPARE BIT 50
J1	28	SDU TV IN
J1	29	SDU TV OUT — not used
J1	30	SDU IF SW
J2	1	AGC VOLTS TO TUNING INDICATOR
J2	2	DF AUDIO
J2	3	NB AUDIO OUT
J2	4	WB AUDIO OUT
J2	5	ALC DEFEAT
J2	6	FM1 TEST POINT
J2	7	FM2 TEST POINT
J2	8	GND

Table 1-1. Power and Signal Connections - Continued

Origin Connector Reference Designator	Pin	Function/Remarks
J3	-	AUDIO OUT
J4	-	RF INPUT
J5	-	SDU OUT (not used)

1.3 ELECTRICAL SPECIFICATIONS.

Electrical specifications for the R-5076/U are listed in table 1-2.

1.4 MECHANICAL SPECIFICATIONS.

Mechanical specifications for the R-5076/U are listed in table 1-3.

Table 1-2. Electrical Specifications

Parameter	Specification
Power requirements (nominal)	+5 (±0.05) V dc, 0.720 A +15 (±0.15) V dc, 0.800 A -15 (±0.15) V dc, 0.290 A +36 (±0.36) V dc, 0.002 A 20.0 W
Frequency range	20 to 149.999 MHz
Reception	AM, FM, CW, SSB
Tuning:	
Minimum step size	1 kHz
Accuracy	≤ 1.0 kHz typical over full temperature range
IF bandwidth	8, 30, and 50 kHz
Sensitivity:	
AM (8-kHz bw, 1-kHz tone, 30% modulation)	With ALC disabled, and an input signal level of -110 dBm, modulation on-to-off ratio is greater than 10 dB
FM (50-kHz bw, 1-kHz tone, 20 kHz zero-to-peak deviation)	With ALC disabled, and an input signal level of -115 dBm, modulation on-to-off ratio is greater than 10 dB
CW (3-dB minimum detectable signal (MDS) plus noise-to-noise in the 8-kHz bandwidth)	With ALC disabled, the signal level for MDS is less than -125 dBm
SSB (3.2-kHz bw, 1-kHz tone)	With ALC and MGC fixed at optimum level, an input signal of -110 dBm, signal on-to-off ratio is greater than 10 dB.
Noise figure	8 dB typical, 10 dB maximum
RF preselection:	
Tuning	4 bands, two 2-pole voltage-tuned, tracking filters
Bandwidth	5% of tuned frequency (typical)

Table 1-2. Electrical Specifications - Continued

Parameter	Specification
Third order intermodulation products	Minimum 75 dB down for two -35 dBm input signals
Image rejection	100 dB typical, 80 dB minimum
IF rejection	85 dB typical, 70 dB minimum
Lo radiation	-100 dBm maximum at J4
Lo stability	1 ppm/hr at constant temperature following warmup
Test source	Injects known FM signals on command into each receiver frequency band
Gain control:	
Manual (MGC/LMGC) AM/FM/CW/SSB	70 dB range, digitally controlled in 2- to 3-dB increments
Automatic (AGC)	
Variation	<2 dB audio change for an RF input change of -110 to -10 dBm
Attack time constant	10 ms (nominal)
Delay time constant	80 ms AM/FM (nominal) 800 ms CW (nominal)
ALC, audio held constant within 1 dB for:	
AM	20 to 90% modulation
FM	6 to 20 kHz peak deviation (50 kHz bw)
SSB	N/A
Antenna input	50Ω nominal, OSM coaxial connector
Maximum input signal level	+20 dBm
Outputs:	
Front panel phone jack	1 V p-p into 600Ω
Data line bandwidth	1 V p-p into 600Ω, 3.0 kHz, 16 kHz
AGC/signal strength	0 to 5 V dc coupled into 1000Ω
Tuning indicator	2 leads for circuit measurement
Reliability	9000 hours mean time between failures

Table 1-3. Mechanical Specifications

Parameter	Specification
Dimensions	
Width	5.08 cm (2.0 in)
Height	19.3 cm (7.6 in)
Depth	32.0 cm (12.6 in)
Weight	2.95 kg (6.5 lb)
Environmental specifications	
Temperature	-20° to +55°C (-40° to +131°F)
Humidity	0 to 98%
Altitude	0 to 12,192 m (0 to 40,000 ft)

SECTION II

PREPARATION FOR USE

2.1 UNPACKING AND INSPECTION.

The R-5076/U is thoroughly inspected at the factory for optimum performance prior to shipment and should arrive ready for use. As soon as the equipment is unpacked, check the contents against the packing slip and inspect the items for possible damage incurred during shipment. Visually inspect all exterior surfaces for broken elements or damaged connectors. Check all internal coaxial cables and CCAs for loose connections. Report any discrepancies through proper channels.

2.2 INSTALLATION.

Refer to figure FO-2 for cabling and wiring information. Install the R-5076/U in a DF chassis assembly as follows:

a. Place the R-5076/U on the receiver mounting plate with the external connectors facing the rear of the DF chassis.

b. Slide the receiver toward the front of the DF chassis until the guide pin spring is fully compressed. Hold in place while performing step c.

c. Lift the two airborne transport releases into position and hand-tighten.

d. Connect power control, signal, and RF input cables to J1, J2, and J4, respectively.

SECTION III

OPERATION

3.1 GENERAL.

The R-5076/U is remotely controlled by a unit capable of generating a 51-bit command word to control operation of the receiver. No operator action is required. Refer to the applicable system operating instructions for specific R-5076/U operating sequences and set-up procedures.

3.2 CONTROLS AND INDICATORS.

Front panel controls are limited to a local audio monitoring jack and a gain control, which are primarily maintenance features. The gain control varies only the audio level of the headset plugged into the headphone jack, and does not affect R-5076/U audio output levels at connector J2. Refer to table 3-1 and figure 3-1 for locations and descriptions of the R-5076/U front panel controls.

3.3 OPERATING PROCEDURES.

To use the receiver monitoring controls, proceed as follows:

a. Connect headphone to headphone jack J3 on R-5076/U front panel.

b. Adjust gain control R1 for adequate audio at the headphone.

Table 3-1. R-5076/U Controls

Control or Indicator	Type	Position	Function
Headphone out	Jack J3	-	Enables connection of headset for narrowband audio monitoring.
Gain control	Potentiometer R1	Variable	Adjusts volume of monitored narrowband audio.

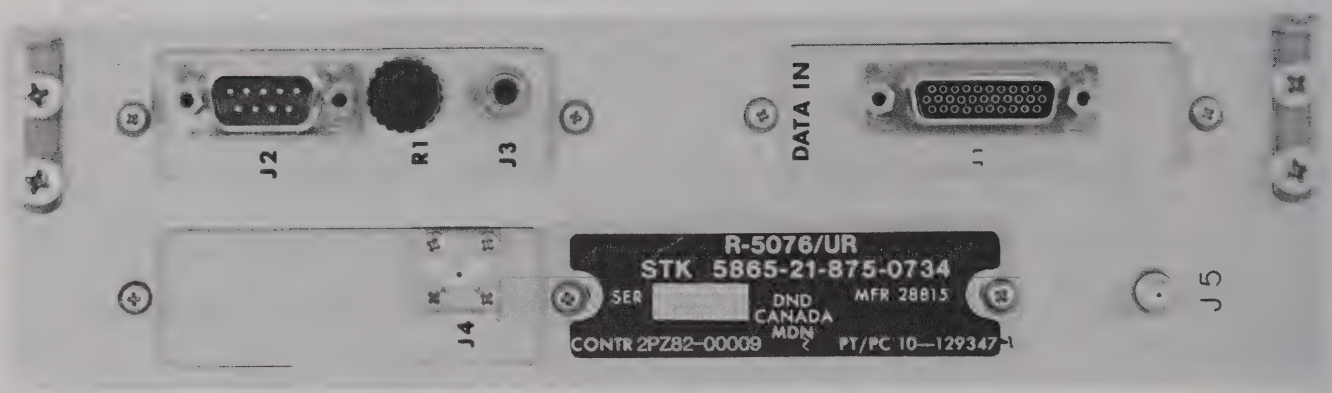

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Figure 3-1. Radio Receiver R-5076/U Controls

SECTION IV

THEORY OF OPERATION

4.1 GENERAL.

This section provides theory of operation for the R-5076/U at a functional block diagram level and a detailed schematic diagram level. The purpose of this section is to explain the circuit operation of each ECA and CCA.

4.2 FUNCTIONAL DESCRIPTION.

The R-5076/U is a remotely controlled radio receiver using four RF bands to provide AM, CW, FM, USB, and LSB coverage in the 20- to 149.999-MHz frequency range. Receiver control functions (gain, IF bandwidth, reception mode selection, and tuning) are accomplished by a digital command.

A simplified block diagram of the R-5076/U is shown in figure 4-1. The R-5076/U contains RF preselect circuits, mixer and local oscillator circuits, IF amplifiers and detectors, an RF test source, remote control and tuning circuits, and a single-sideband adapter. The RF preselect circuit accepts the RF input signal, amplifies the signal, and routes it to the mixer circuit. The mixer circuit mixes the input RF signal with an internally generated local oscillator signal to down-convert the received RF signal to the R-5076/U's intermediate frequency. The IF signal is then amplified and detected through the IF amplifiers and detectors to provide IF receiver narrowband audio, wideband audio, DF audio, headset and AGC metering outputs. The synthesizer circuits accept the R-5076/U input commands (load, clock, and data pulses), which control the R-5076/U's tuned frequencies and operating modes. When activated, the R-5076/U RF test source (BITE) provides calibrated FM signals to the RF preselect circuits for test purposes.

4.2.1 FRONT END ECA A1.

Front End ECA A1 (see figures FO-1 and FO-2) consists of RF preselect CCA A1A1, local oscillator CCA A1A2, first mixer IF CCA A1A3, and test source CCA A1A4. ECA A1 is tuned to receive signals of interest in the 20- to 149.999-MHz frequency range through the tuning voltage and bandselect logic signals generated by Synthesizer ECA A2. ECA A1 then converts the input frequency to the R-5076/U's intermediate frequency for further processing within the other ECAs of the R-5076/U. Test source CCA A1A4 generates the signals used to test the R-5076/U functional operation. Overall RF gain is 15 dB minimum.

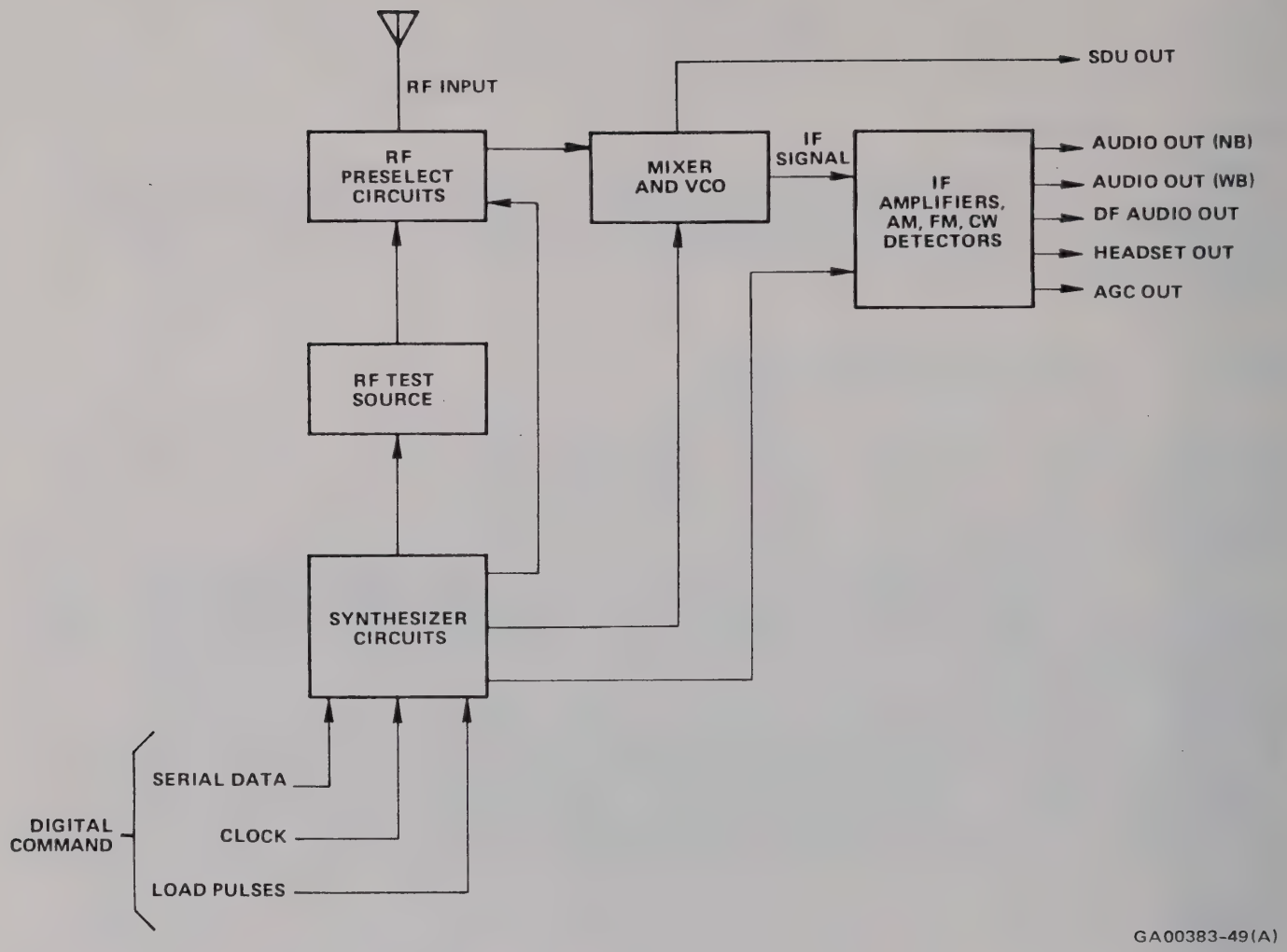

Figure 4-1. Radio Receiver R-5076/U Simplified Block Diagram

4.2.1.1 RF PRESELECT CCA A1A1. RF preselect CCA A1A1 contains four tunable-bandpass filters and an RF amplifier, which accepts the R-5076/U's 20- to 149.999-MHz RF input and provides an amplified RF output signal. When the system operator selects a specific operating frequency, synthesizer CCA A2A1 responds by generating a band select signal and a frequency tuning voltage. The band select signal activates the filter network that corresponds to the band of the frequency selected. The tuning voltage then tunes the preselect to the correct frequency, and the RF input is amplified and coupled to first mixer IF CCA A1A3.

4.2.1.2 LOCAL OSCILLATOR CCA A1A2. Local oscillator CCA A1A2 contains four voltage-controlled oscillators (VCO) that correspond to the four frequency bands of RF preselect CCA A1A1. The same band select signals and frequency tuning voltage used in the preselect are applied to the VCOs. The selected VCO produces an output signal that is either 10.7 MHz or 30 MHz above the tuned frequency of the preselect. If the tuned frequency is between 20 and 59.999 MHz (bands 1 and 2), the selected VCO produces a signal that is 10.7 MHz above the preselect tuned frequency. If the tuned frequency is between 60 and 149.999 MHz (bands 3 and 4), the selected VCO produces a signal that is 30 MHz above the preselect tuned frequency. The selected VCO output signal is then amplified and routed to first mixer IF CCA A1A3. The output signal is also routed to synthesizer CCA A2A1 as VCO feedback.

4.2.1.3 FIRST MIXER IF CCA A1A3. First mixer IF CCA A1A3 contains an RF amplifier, mixer, IF amplifier, and a directional coupler. The RF output from RF preselect CCA A1A1 is amplified by the RF amplifier, converted to the R-5076/U's IF frequencies by the mixer, and routed through the IF amplifier and directional coupler. The directional coupler provides an IF output to front-panel connector J5. The other output from the directional coupler is a 10.7-MHz or 30-MHz IF signal, which is routed to first IF amplifier/detector CCA A3A1.

4.2.1.4 TEST SOURCE CCA A1A4. Test source CCA A1A4 contains an RF test source that, when activated by the RF test select signal from decoder CCA A2A2, provides a series of FM test signals to RF preselect CCA A1A1 for use during R-5076/U tests. The FM signals within the R-5076/U's tuning range occur at the following frequencies (MHz): 21, 39, 41, 59, 61, 79, 81, 99, 101, 119, 121, 139, 141.

4.2.2 SYNTHESIZER ECA A2.

Synthesizer ECA A2 (see figures FO-1 and FO-2) consists of synthesizer CCA A2A1 and decoder CCA A2A2. Synthesizer ECA A2 performs digital command decoding to produce discrete command bits that are required to control each operating function of the R-5076/U. Control of the phase-locked loop (PLL) is also performed by ECA A2, requiring only VCO feedback to complete the loop. In addition, ECA A2 develops analog voltages and performs switching functions required for receiver operation.

4.2.2.1 SYNTHESIZER CCA A2A1. Synthesizer CCA A2A1 consists of substrate assembly A2A1A1, loop amplifier CCA A2A1A2, and other logic and discrete circuits. Substrate assembly A2A1A1 receives serial data tuning bits from decoder CCA A2A2 and converts them to parallel address bits for addressing one PROM for band selection. Assembly A2A1A1 also processes a local oscillator feedback signal and two frequency reference signals for use in the PLO circuit. These signals are then phase-compared, amplified by loop amplifier CCA A2A1A2, and

conditioned to produce the tuning voltage necessary for precise control of the RF preselect and local oscillator frequencies.

4.2.2.2 DECODER CCA A2A2. Decoder CCA A2A2 contains a substrate assembly A2A2A1, a serial-to-parallel converter, a digital-to-analog (D/A) converter, discrete switches, and logic converters. The serial-to-parallel converter decodes the digital command data words received from the system and, in turn, produces data bits that will select the type of reception (AM, FM, CW), select bandwidth (8 kHz, 30 kHz, 50 kHz), select gain control (AGC, MGC, or LMGC), select squelch (ON or OFF), and select RF test (when self test is required).

4.2.3 FIRST AND SECOND IF AMPLIFIER/DETECTOR ECA A3.

First and second IF Amplifier/Detector ECA A3 (see figures FO-1 and FO-2) consists of first IF amplifier/detector CCA A3A1 and second IF amplifier/detector CCA A3A2. ECA A3 provides amplification, bandwidth selection, AM, FM, and CW detection, and squelch control. ECA A3 also provides AGC, MGC, LMGC, and ALC.

4.2.3.1 FIRST IF AMPLIFIER/DETECTOR CCA A3A1. First IF amplifier/detector CCA A3A1 consists of a diode switching circuit, an IF converter, three IF amplifier stages, selectable bandwidth filters, and buffer amplifiers. CCA A3A1 receives an IF input signal from first mixer IF CCA A1A3. This IF signal is either 10.7-MHz (bands 1 or 2) or 30 MHz (bands 3 or 4). When the 10.7-MHz IF signal is received, a diode switching signal (10.7-MHz select) is applied from synthesizer ECA A2. This switching signal operates a diode switch and allows the 10.7-MHz IF signal to pass directly to the first-stage IF amplifier.

When the 30-MHz IF signal is received, a corresponding diode switching signal (30 MHz-select) is applied from synthesizer ECA A2. In this case, the switching signal, in addition to operating a diode switch, turns on a 19.3-MHz oscillator in the IF converter circuit. The 30-MHz IF signal then mixes with the 19.3-MHz oscillator signal to produce a 10.7-MHz IF signal that is coupled over to the first-stage IF amplifier for amplification.

The amplified 10.7-MHz IF signal is routed to a selectable bandwidth filter network. Three bandwidths are available to the system operator: 8 kHz, 30 kHz, and 50 kHz. Upon selection, a logic signal is applied from synthesizer ECA A2 to activate the respective bandwidth filter, and the 10.7-MHz IF signal is then band limited by that amount. The IF signal is then amplified by the second-stage IF amplifier and the third-stage IF amplifier, and coupled through a buffer amplifier to second IF amplifier/detector CCA A3A2.

4.2.3.2 SECOND IF AMPLIFIER/DETECTOR CCA A3A2. Second IF amplifier/detector CCA A3A2 contains IF amplifiers, buffer amplifiers, AM and CW detectors, an FM discriminator, audio amplifiers, and circuits to

develop AGC, ALC, and squelch. The 10.7-MHz IF signal received from first IF amplifier/detector CCA A3A1 is coupled through two gain-controlled IF amplifiers and a buffer amplifier. The IF signal is then applied to three different circuits, but the output of only one may be selected. MGC and limited manual gain control (LMGC) are developed on decoder CCA A2A2, but are used on CCA A3A2.

If the input signal is determined to be AM, the operator selects the AM mode and the detected output of the AM detector is coupled through the detector selector to the first audio amplifier. If the input signal is FM, the operator selects the FM mode, and the demodulated output of the FM discriminator is coupled through the detector selector to the first audio amplifier.

If the input signal is CW, the operator selects the CW mode. This energizes the 10.7 MHz beat frequency oscillator (BFO), which is mixed with the CW signal in the product detector producing a beat frequency oscillation. The product detector output is then routed through the detector selector to the first audio amplifier.

Prior to detection, the IF signal is normally level-controlled by an AGC circuit that is selected by the operator to prevent a strong signal from overdriving the IF stages. However, if a higher signal level is required for a weak signal, either MGC or LMGC is selected. When MGC is selected, the IF signal level is controlled exclusively by the system. A dual capability exists when LMGC is selected. In this case, the MGC control in the system functions for low and intermediate signal levels, but the AGC takes over if the signal strength is excessive.

After detection, the audio signal may be squelched to eliminate background noise. Squelch is an operator-selected function. The squelch circuit is set to operate when the received signal strength is below a predetermined level. The output from the first audio amplifier is maintained at a constant level regardless of the level of the detected IF signal, due to the ALC circuit. The ALC circuit can be defeated by the operator. The level-controlled audio is then coupled to both wideband and narrowband output amplifiers. The outputs from these two audio amplifiers are routed to the system. The narrowband amplifier furnishes an additional output that provides audio for the headset. A front panel control adjusts the audio level to the headset. DF audio is also furnished from the R-5076/U. Detected AM signals, in addition to being routed to the first audio amplifier, are also routed through a DF (audio) amplifier, and are available at front panel connector J2 as DF audio.

When the AGC mode is selected, the IF is allowed to generate AGC voltage to control IF amplifier gain. If the MGC mode is selected, a voltage is sent from the synthesizer (decoder CCA A2A2) to override the AGC voltage and enable operator selection of IF gain.

4.2.4 SINGLE-SIDEBAND (SSB) ADAPTER ECA A4.

SSB adapter ECA A4 (see figures FO-1 and FO-2) contains SSB CCA A4A1. CCA A4A1 accepts the receiver IF signal from first and second IF amplifier/detector ECA A3 and provides SSB filtering for the IF signal when the receiver is operating in the SSB modes (USB or LSB).

CCA A4A1 contains a switching logic, a 10.7-MHz to 500-kHz down-converter, USB and LSB mechanical filters, and a 500-kHz to 10.7-MHz up-converter. The IF signal received from CCA A3A1 is applied to a switch within CCA A4A1. If the receiver is operating in the AM, FM or CW modes, the switches within CCA A4A1 will route the IF signal back to ECA A3 for a signal detection. However, if the receiver is operating in the SSB mode, the IF signal is converted from 10.7 MHz to 500 kHz via the down-converter and applied to the USB and LSB filters. The USB filter eliminates all except the desired USB components of the IF signal, and the LSB filter eliminates all except the desired LSB components. The outputs of the filters are applied to a switch that selects either the USB filter output for the receiver USB mode, or the LSB filter output for the receiver LSB mode. The control signals governing the switching action within CCA A4A1 are generated by decoder CCA A2A2 in accordance with the receiver input digital command data.

The selected SSB output 500-kHz signal from the switch is up-converted to the receiver IF frequency (10.7 MHz), and routed to ECA A3 for amplification and detection.

4.3 DETAILED THEORY OF OPERATION.

4.3.1 FRONT END ECA A1.

4.3.1.1 RF PRESELECT CCA A1A1. (See figures 4-2 and FO-3.) RF preselect CCA A1A1 contains four tunable filters that permit preselection of the desired RF signal. The filter required for each R-5076/U band is selected by synthesizer ECA A2. The individual filters can be tuned over the following ranges:

Band 1	20	to	35.999 MHz
Band 2	36	to	59.999 MHz
Band 3	60	to	99.999 MHz
Band 4	100	to	149.999 MHz

Since the four filters operate in a similar manner, only the band 1 preselect is described. The band 1 preselect (20 to 35.999 MHz) is selected by applying a positive voltage to the band 1 select terminals of CCA A1A1. This positive voltage comes from local oscillator CCA A1A2. The positive voltage biases the diode switches to allow a signal to pass from the antenna input through the first voltage-tuned filter to RF amplifier U1 through the second voltage-

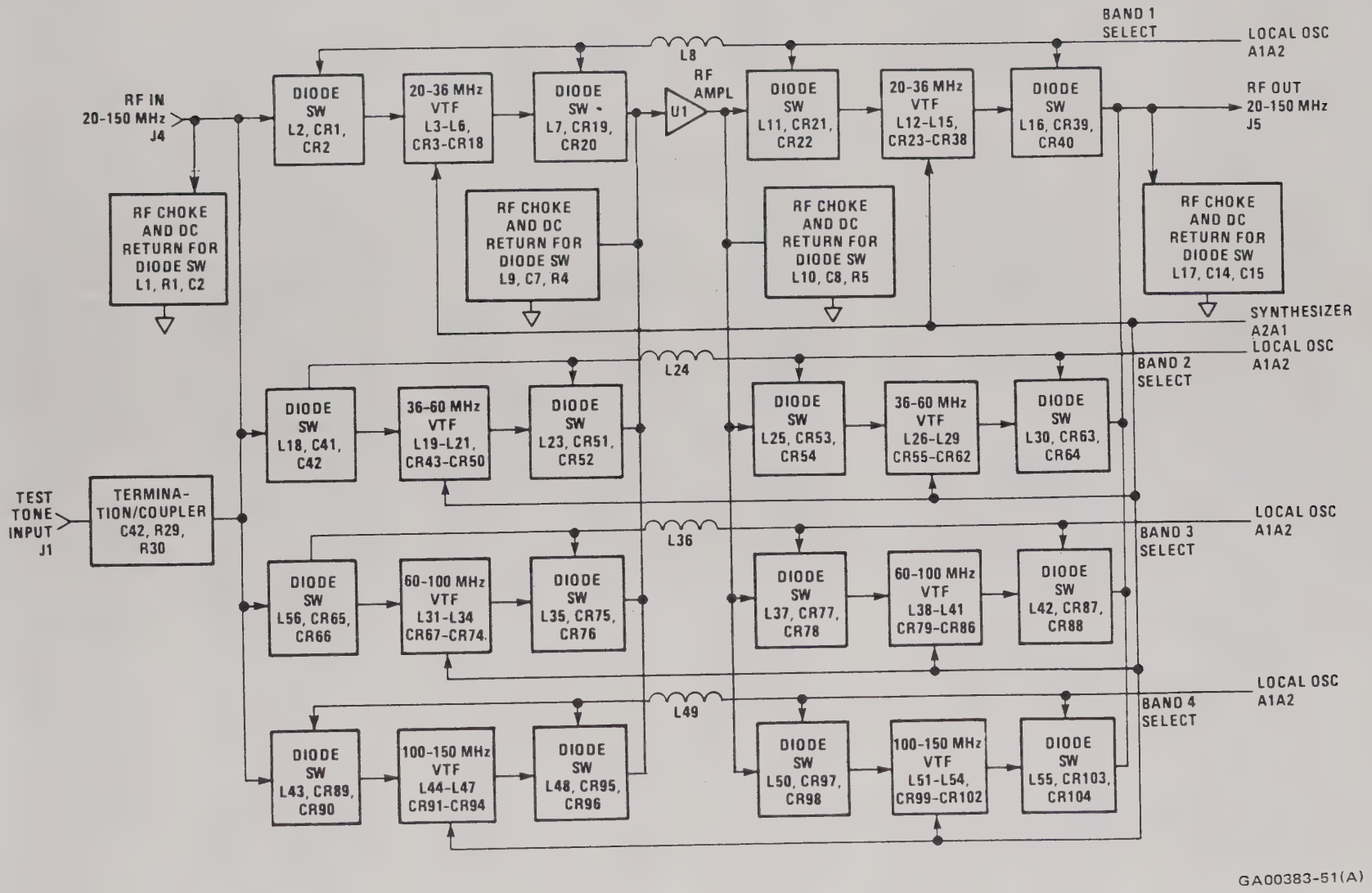
RF IN
20-150 MHz
J4
RF CHOKE AND DC RETURN FOR DIODE SW L1, R1, C2
DIODE SW L2, CR1, CR2
20-36 MHz VTF L3-L6, CR3-CR18
DIODE SW L7, CR19, CR20
L8
RF AMPL
U1
RF CHOKE AND DC RETURN FOR DIODE SW L9, C7, R4
RF CHOKE AND DC RETURN FOR DIODE SW L10, C8, R5
DIODE SW L11, CR21, CR22
20-36 MHz VTF L12-L15, CR23-CR38
DIODE SW L16, CR39, CR40
BAND 1 SELECT
LOCAL OSC A1A2
RF OUT 20-150 MHz J5
RF CHOKE AND DC RETURN FOR DIODE SW L17, C14, C15
SYNTHESIZER A2A1
LOCAL OSC A1A2
BAND 2 SELECT
L24
DIODE SW L18, C41, C42
36-60 MHz VTF L19-L21, CR43-CR50
DIODE SW L23, CR51, CR52
DIODE SW L25, CR53, CR54
36-60 MHz VTF L26-L29 CR55-CR62
DIODE SW L30, CR63, CR64
TEST TONE INPUT J1
TERMINATION/COUPLER C42, R29, R30
LOCAL OSC A1A2
BAND 3 SELECT
L36
DIODE SW L56, CR65, CR66
60-100 MHz VTF L31-L34 CR67-CR74
DIODE SW L35, CR75, CR76
DIODE SW L37, CR77, CR78
60-100 MHz VTF L38-L41 CR79-CR86
DIODE SW L42, CR87, CR88
LOCAL OSC A1A2
BAND 4 SELECT
L49
DIODE SW L43, CR89, CR90
100-150 MHz VTF L44-L47 CR91-CR94
DIODE SW L48, CR95, CR96
DIODE SW L50, CR97, CR98
100-150 MHz VTF L51-L54, CR99-CR102
DIODE SW L55, CR103, CR104
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Figure 4-2. RF Preselect CCA A1A1 Block Diagram

tuned filter to RF output terminal J5. There is approximately 10 dB of gain between the antenna input and J5.

When the band 1 preselect is not selected, a negative voltage is applied to the band 1 select terminal. This action places a reverse bias on diodes CR1, CR20, CR21, and CR39, and a forward bias on CR2, CR19, CR22, and CR40 to shunt the band 1 signal path to ground. The tuning voltage supplied by synthesizer ECA A2 is applied to all tuning filters, but affects only the band selected to pass signals to the mixer.

4.3.1.2 LOCAL OSCILLATOR CCA A1A2. (See figures 4-3 and FO-4.) The binary-coded decimal band select lines are fed into band decoder U2 from band select HPROM U4 on substrate assembly CCA A2A1A1. Band decoder U2 produces four band-command outputs that are also buffered through power amplifiers Q5 thru Q8 to turn on the selected band in the RF preselect and to turn on the selected VCO and gate its output to the amplifier and directional coupler. The other input to the local oscillator is the tuning voltage from synthesizer CCA A2A1 via RF preselect CCA A1A1.

Each band of the local oscillator consists of a VCO and a diode gate to control the output. Using band 1 as an example, oscillator Q1 is controlled by a feedback network consisting of C2, C3, T1, and varactor diodes CR2 and CR3. The tuning range is tracked to the band 1 RF preselect plus a 10.7-MHz offset to produce a band 1 intermediate frequency of 10.7 MHz.

The band 1 VCO signal is gated through switching diode CR4 to variable attenuator CR17, CR18, CR19, and Q10, amplifier U1, and directional coupler DC1. The signals that control the VCO gating diodes also control the gate bias for each VCO. The signals turn the unused VCOs off as well as gate them out of the buffer circuits. The signal out of U1 is applied to directional coupler DC1 whose main output is the local oscillator (LO) signal through buffer amplifier U4. The other output of DC1 is routed through buffer U3 to provide output signals that drive synthesizer CCA A2A1 and test point LO output J8.

The output level of the local oscillator is held at a constant level by the variable attenuator and feedback amplifier U5, Q11, and CR20. CR20 rectifies the LO signal and sends it to U5 where it is compared to a dc level set by voltage divider R43 and R44. Q11 receives its bias from U5 and controls the dc bias current through CR17, CR18, and CR19, which controls the amplitude of the LO signal. Q10 and VR5 are used to preset the dc bias level through the variable attenuator.

4.3.1.3 FIRST MIXER IF CCA A1A3. (See figures 4-4 and FO-5.) A high-level mixer (A1) mixes the amplified (U1) RF input signal from RF preselector CCA A1A1 and the signal from local oscillator CCA A1A2 to produce the intermediate frequency. For bands 1 and 2 (refer to

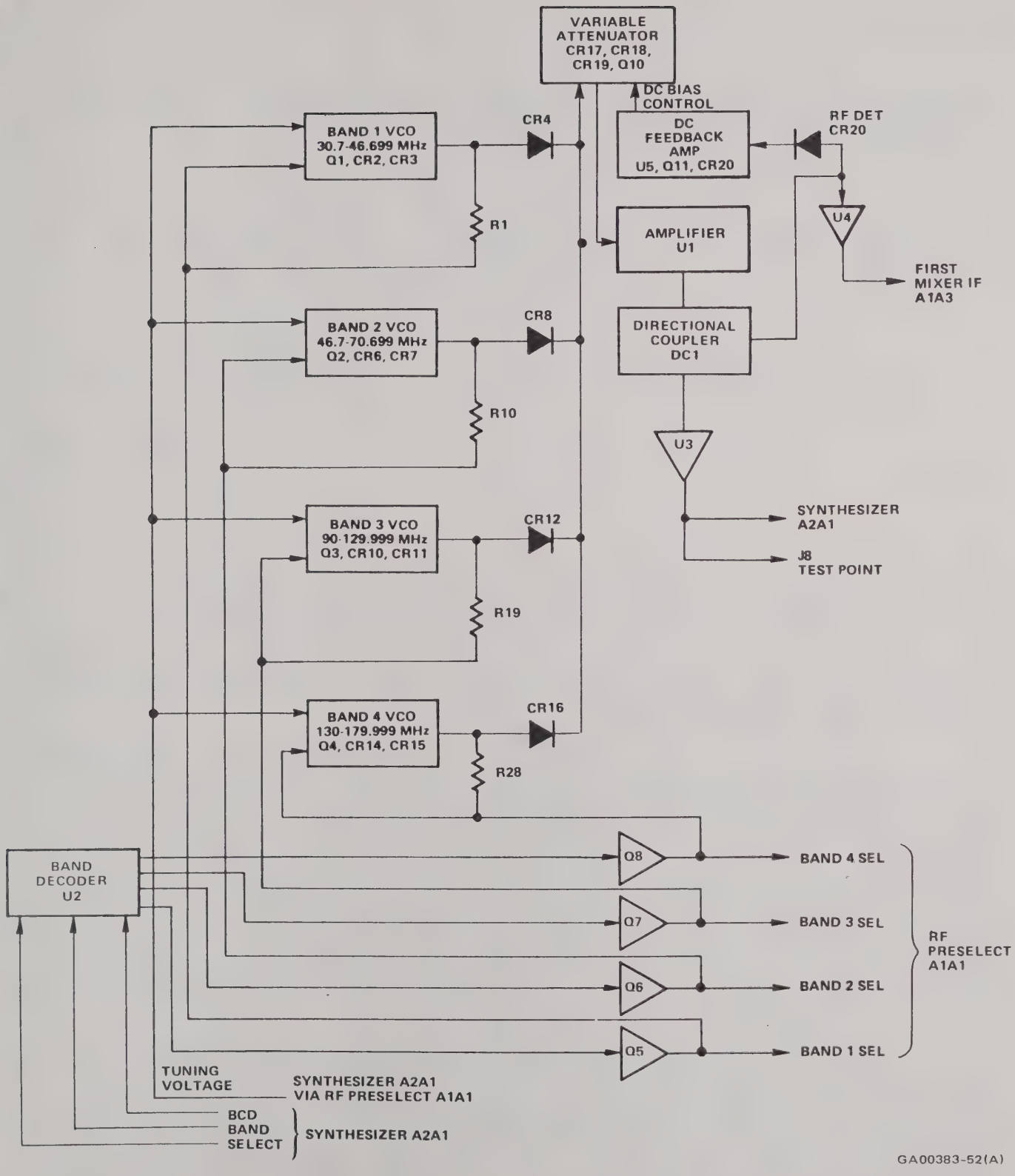

Figure 4-3. Local Oscillator CCA A1A2 Block Diagram

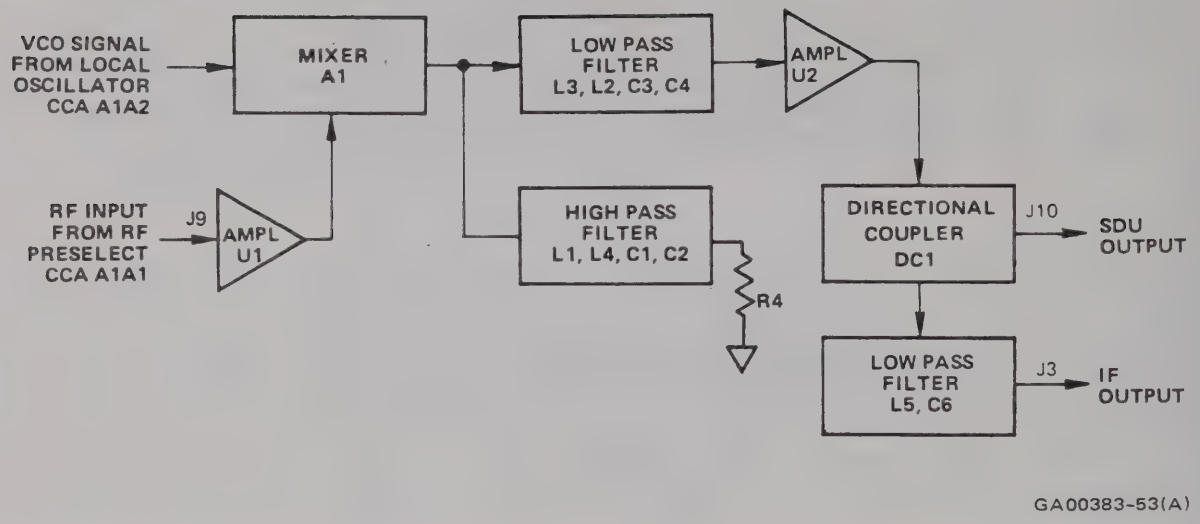

Figure 4-4. First Mixer IF CCA A1A3 Block Diagram

paragraph 4.3.1.1 for band frequencies), the IF frequency is 10.7 MHz. The upper two bands use an IF signal of 30 MHz. The use of two IF ranges provides improved spurious rejection.

The mixer output passes through a high-pass/low-pass filter to separate the IF harmonics (above 36 MHz) from the main signal path. Higher mixer harmonics and the LO signal, if not terminated, impair proper mixer operation for the desired mixer responses (10.7 and 30 MHz). Amplifier U2 improves the R-5076/U noise figure by providing front end gain. After amplification, the IF signal is routed through directional coupler DC1. DC1 provides two outputs, SDU output (not used) and IF output. Low-pass filter L5 and C6, on the output of DC1 in the IF signal path, prevents the LO signal from being passed to the IF amplifier. The net signal gain between RF INPUT E3 and IF OUTPUT E7 is 3 dB minimum. The IF output is sent to first IF amplifier/detector CCA A3A1.

4.3.1.4 TEST SOURCE CCA A1A4. (See figures 4-5, 4-6, and FO-6.) Test source CCA A1A4, upon command, provides the RF test signals to RF preselect CCA A1A1. The test source provides FM signals at 19, 21, 39, 41, 59, 61, 79, 81, 99, 101, 119, 121, 139, and 141 MHz. By using this method, signals for each of the R-5076/U's four frequency bands are generated. The test source is activated by the test tone ON control data bit 39, which is decoded by decoder CCA A2A2. When

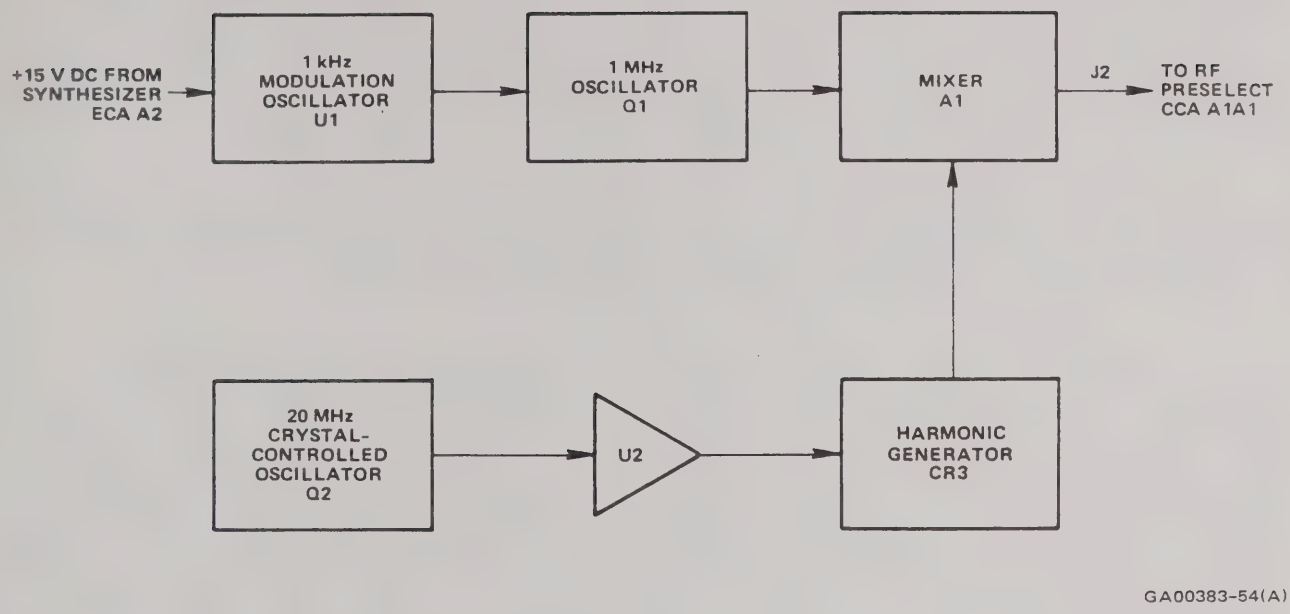

Figure 4-5. Test Source CCA AlA4 Block Diagram

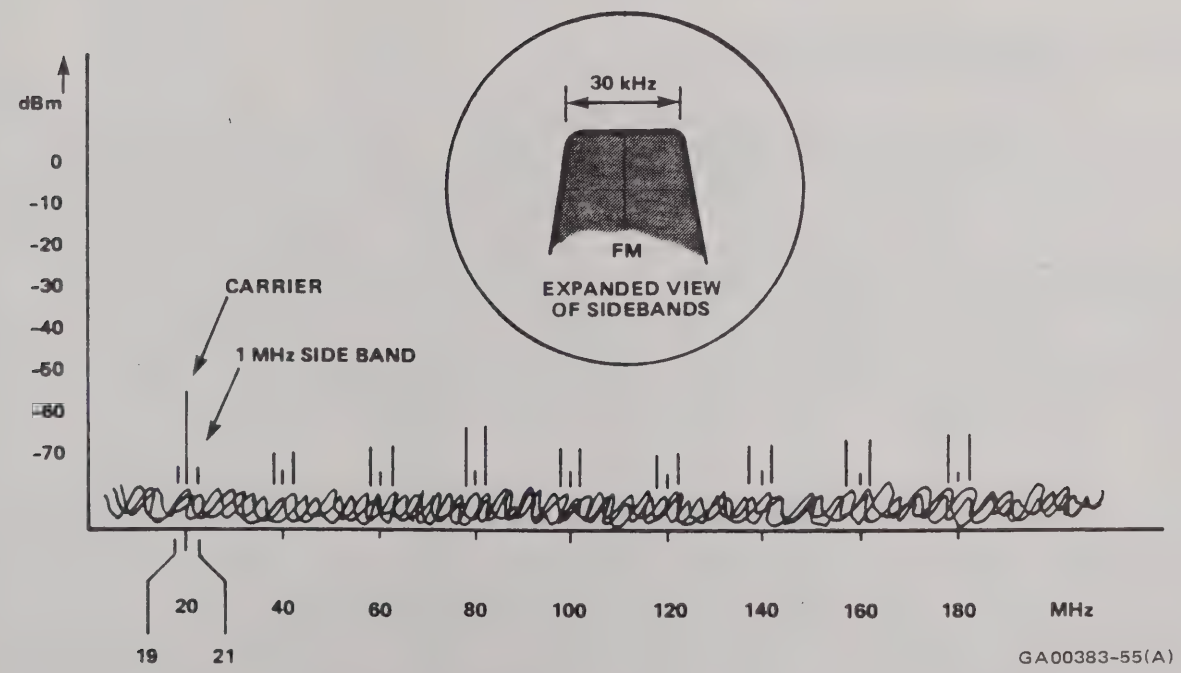

Figure 4-6. Test Source Output

this command is received, the decoder applies +15 V dc to E2 of the test source. When the circuits are activated, the output of the 1-kHz modulation oscillator (U1) is fed to a 1-MHz oscillator (Q1), which produces a 1-MHz FM signal. The 1-MHz signal is fed to mixer A1 and mixed with the output of the harmonic generator. The harmonic generator (CR3) produces integral multiples of the 20-MHz external oscillator output (20 MHz, 40 MHz, 60 MHz, ... 140 MHz).

When the test source is turned on by +15 V dc from decoder CCA A2A2, U1 is biased at 5.6 V dc by VR1 and is configured as an audio oscillator with resistance capacitance (RC) circuits R6, C4, R3, and C3, determining the frequency of oscillation.

The 1-kHz frequency is passed through a low-pass filter consisting of R7 and C5 to provide a modulating signal to varactor diode CR1. The frequency of 1-MHz VCO Q1 is controlled by the tank circuit consisting of L1, C7, C8, C10, C13, C14, and varactor CR1. The 1-MHz center frequency of the oscillator is adjusted by variable inductor L1. The oscillator output is fed through center-tapped transformer T1, for impedance matching, into balanced mixer A1. The other input to the mixer is generated by the 20-MHz crystal oscillator formed by Q2 and Y1. The 20-MHz output is fed through buffer amplifier U2 and impedance matching transformers T2 and CR24 to step-recovery diode CR3. Diode CR3 is a harmonic-generating element that produces multiples of the 20-MHz input signal. This frequency spectrum is fed through an attenuator pad consisting of R23 thru R26 to mixer A1. The resulting output frequencies from mixer A1 are fed through a resistive pad consisting of R18 thru R22 to RF test output J2. This is then routed to RF preselect CCA A1A1.

4.3.2 SYNTHESIZER ECA A2.

Synthesizer ECA A2 (see figures FO-1 and FO-2) comprises synthesizer CCA A2A1 and decoder CCA A2A2. The function of the synthesizer is to control the operation of the R-5076/U in response to the 51-bit tuning word command received from the system computer. Table 4-1 shows the individual bit assignments of the 51-bit serial command word. The command word is received by decoder CCA A2A2. All except the first three bits are stored in two 24-bit serial-in-parallel-out shift registers cascaded to form one 48-bit shift register. The first register is contained in the decoder CCA substrate assembly A2A2A1 and the other in the synthesizer CCA substrate assembly A2A1A1.

4.3.2.1 SYNTHESIZER CCA A2A1. Synthesizer CCA A2A1 (see figures 4-7 and FO-7) consists primarily of substrate assembly A2A1A1, frequency band decoder A2A1U4, phase lock loop (PLL) control logic, loop amplifier CCA A2A1A2, and signal display unit (SDU) logic that is not used in this application. The function of the synthesizer CCA logic is to accurately tune the R-5076/U front end to the frequency selected by frequency control bits 4 thru 27 of the command word. Command word bits 4 thru 27 are received serially from decoder CCA A2A2 by a shift

Table 4-1. Command Bit Assignments

Bit No	Function	Level
1	Spare	
2	Spare	
3	Tuning 8 x 100 MHz*	
4	Tuning 4 x 100 MHz	
5	Tuning 2 x 100 MHz	
6	Tuning 1 x 100 MHz	
7	Squelch	"1" on, "0" off
8	Tuning 8 x 10 MHz	
9	Tuning 4 x 10 MHz	
10	Tuning 2 x 10 MHz	
11	Tuning 1 x 10 MHz	
12	Tuning 8 x 1 MHz	
13	Tuning 4 x 1 MHz	
14	Tuning 2 x 1 MHz	
15	Tuning 1 x 1 MHz	
16	Tuning 8 x 100 kHz	
17	Tuning 4 x 100 kHz	
18	Tuning 2 x 100 kHz	
19	Tuning 1 x 100 kHz	
20	Tuning 8 x 10 kHz	
21	Tuning 4 x 10 kHz	
22	Tuning 2 x 10 kHz	
23	Tuning 1 x 10 kHz	
24	Tuning 8 x 1 kHz	
25	Tuning 4 x 1 kHz	
26	Tuning 2 x 1 kHz	
27	Tuning 1 x 1 kHz	
28	MGC/AGC	
29	MGC Control	Weight 16
30	MGC Control	Weight 8
31	MGC Control	Weight 4
32	MGC Control	Weight 2
33	MGC Control	Weight 1
34	LMGC	
35	Function Select (AM, FM, CW)	
36	IF BW Select	
37	IF BW Select	
38	Function Select (AM, FM, CW)	
39	Test Tones ON/OFF	"1" on, "0" off
40	LSB*	
41	USB*	
42	Spare Bit (Not Used)	
43	Spare Bit (Not Used)	
44	Not Used (Clarifier)	Weight 32
45	Not Used (Clarifier)	Weight 16
46	Not Used (Clarifier)	Weight 8
47	Not Used (Clarifier)	Weight 4
48	Not Used (Clarifier)	Weight 2
49	Not Used (Clarifier)	Weight 1
50	Spare Bit	
51	Tune Receiver A/B*	"1" A, "0" B

Bits 28 and 34 select AGC/MGC characteristics. They are defined as follows:

Bit No. 28	Bit No. 34	AGC/MGC Characteristic
0	0	AGC
1	0	MGC
don't care	1	LMGC

Bits 36 and 37 select the receiver IF filters. They are defined as follows

Bit No 36	Bit No 37	IF Bandwidth Selected
0	0	8 kHz
0	1	30 kHz
1	0	50 kHz

Bits 35 and 38 select type of reception (function). They are defined as follows:

Bit No. 35	Bit No. 38	Function Selected
0	0	FM
0	1	AM
1	0	CW

Bits 40 and 41 select single-sideband mode. They are defined as follows:

Bit No. 40	Bit No. 41	
0	0	SSB off
0	1	USB
1	0	LSB

*Not used in R-5076/U.

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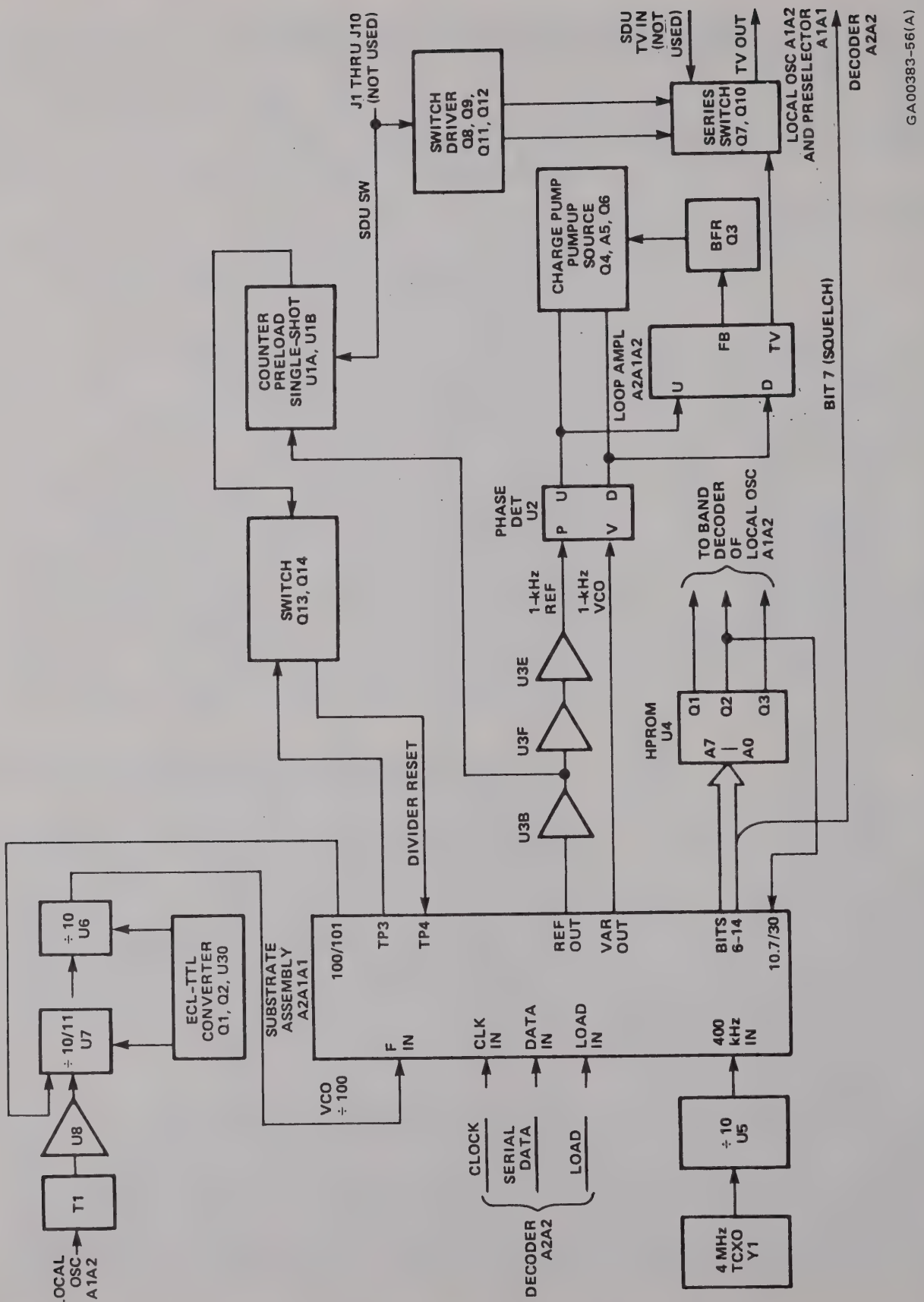


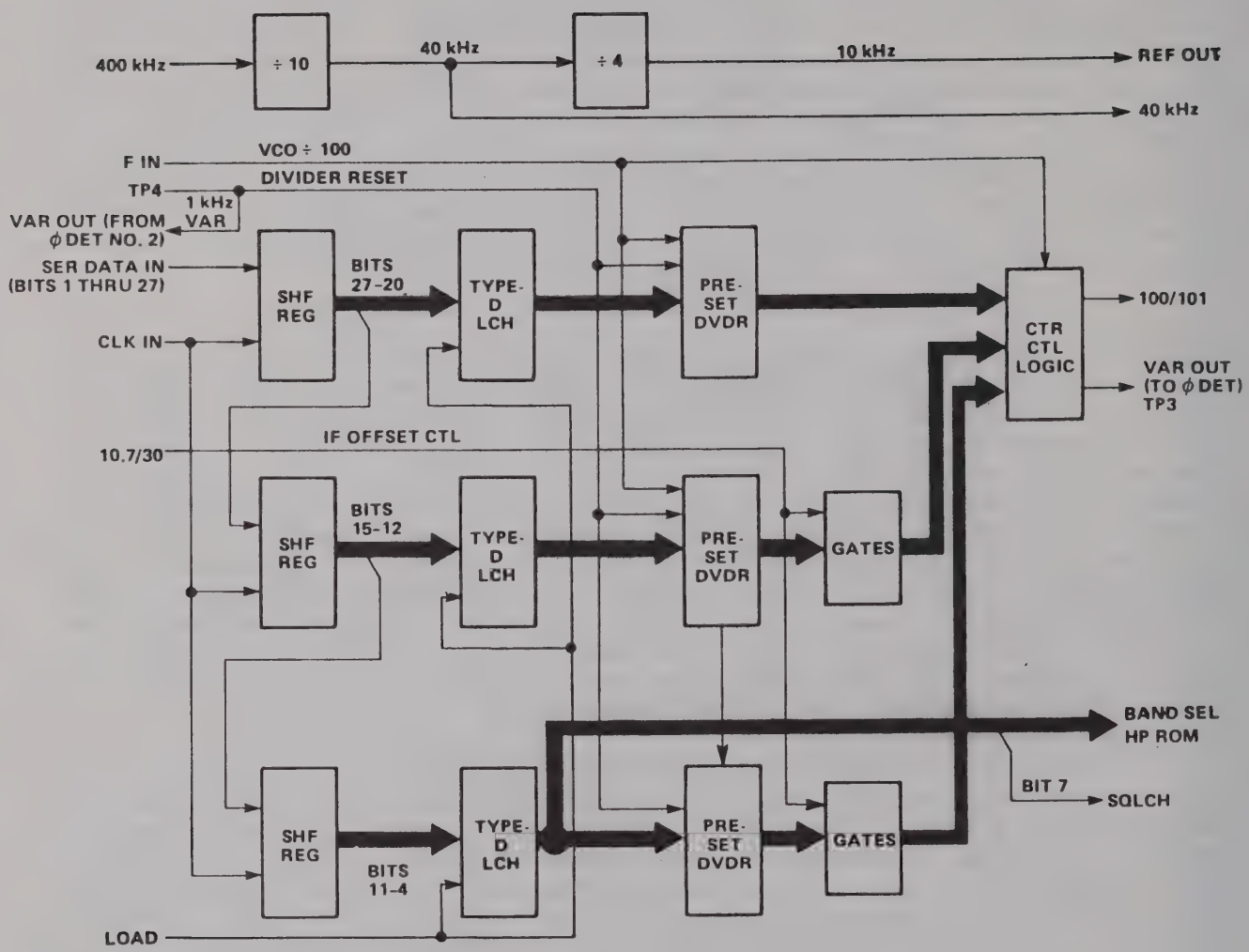
Figure 4-7. Synthesizer CCA A2A1 Block Diagram

register in the substrate assembly and loaded into latches for decoding. Bits 6 and 8 thru 14 are routed as an address to the frequency band decoder PROM U4, which generates a three-bit band selection code (0 to 3 in binary notation) to select the appropriate frequency band, 1 thru 4. (Refer to paragraph 4.3.1.1 for band ranges.) This code selects the applicable tunable filter in RF preselect CCA A1A1 and the applicable VCO in local oscillator CCA A1A2. Preset counters in the substrate assembly are then used to compare the frequency output from the selected VCO with the calculated high frequency. The high frequency, or desired VCO output, is the sum of the command word frequency and the appropriate intermediate frequency. The PLL logic increases or decreases the tuning voltage (TV) to local oscillator CCA A1A2 to increase or decrease the VCO frequency within its band range until it corresponds to the calculated high frequency, which tunes the R-5076/U to the commanded tuning frequency.

4.3.2.1.1 Substrate Assembly A2A1A1. Substrate assembly (IELOB-01) A2A1A1 is a proprietary module. The logic, shown in block diagram form in figure 4-8, comprises serial data reception and storage logic, frequency decode logic, and 1-kHz reference logic. The purpose of this assembly is to receive and store the tuning frequency command bits (command word bits 4 thru 27), route bits 6 thru 14 as outputs for use in frequency band selection and squelch control (bit 7), generate an accuracy 1-kHz reference signal, and generate a VCO sense signal. The VCO sense signal is a divided-down sample of the VCO output that is exactly in phase with a 1-ms pulse sampled from the 1-kHz reference when the selected VCO (in local oscillator CCA A1A2) is correctly tuned for reception of the RF frequency designated by the tuning command, stored in the serial data latches.

The serial data reception and storage logic consists of three cascaded eight-bit serial-in-parallel-out shift registers and D-type latches for each of the 24 parallel output lines. Command word bits 1 thru 27 are received on the DATA IN line from decoder CCA A2A2 and are clocked into the shift register by clock pulses on the CLK IN line. The last three clock pulses shift bits 1, 2, and 3, which are not used, out the end of the shift register as bits 25, 26, and 27 are clocked in the front. Bit 4, therefore, is the most significant bit. The LOAD pulse loads the data into the latches after the final clock pulse.

The frequency decode logic consists of three preset counters and a counter control module. The clock input to this logic is the F IN signal from the PLL logic. The F IN signal has a frequency equal to the active VCO frequency divided by 100. The counters are connected in the count-down mode to function as dividers. During each sampling cycle, initiated by a 1-kHz reference pulse, the frequency decode logic divides the VCO/100 frequency (F IN) by N to generate an output pulse on the VAR OUT line. Because the counters are preloaded to initiate a division cycle at the start of a 1-ms (1-kHz) reference pulse (REF OUT), the next reference pulse is coincident with the VAR OUT pulse when VCO/100 equals N. The value of N equals the sum of the tuning frequency stored in the latches, plus the intermediate



NOTE: BITS 1 THRU 3 ARE SHIFTED OUT OF THE REGISTER AND NOT USED IN THE R-5076/U.

GA00383-57(A)

Figure 4-8. Substrate Assembly A2A1A1 (IELOB-01)

frequency supplied by the counter control logic. The IF OFFSET CTL line from band decoder PROM U4 selects the IF, either 10.7 MHz (low) or 30 MHz (high). When the VCO frequency is greater than N, the VAR OUT pulse leads the next REF OUT pulse; when it is less than N, the VAR OUT pulse trails the next REF OUT pulse.

The 1-kHz reference logic comprises two divide-by-two counters and two divide-by-ten counters that divide the 400-kHz input reference voltage by 400 to produce a 1-kHz output on the REF OUT line.

4.3.2.1.2 Frequency Band Decoder A2A1U4. PROM U4 provides the frequency band selection function. Command word bits 6 and 8 thru 14 from the substrate assembly are used as the address inputs to select bands 1 thru 4 in binary notation (0 thru 3) on three of the four output lines. Table 4-2 shows the programming truth table. Output Q2 (2^1) is also used as the IF OFFSET CTL signal to the A1 counter control logic; consequently, this signal is low for frequency bands 1 and 2 (10.7 IF select) and high for bands 3 and 4 (30 MHz IF select).

4.3.2.1.3 Phased Lock Loop Control Logic. The primary components of the PLL control logic are transformer T1; 100/101 two-modulus counter U6, U7; ECL/TTL conversion logic Q1, Q2, and U3C; counter preload one-shot U1A; phase detector U2; pump-up/pump-down logic Q3, Q4, Q5, and Q6; and passive switches Q7, Q10, and Q13, Q14. The PLL control logic controls the PLL comprising the currently active VCO in local oscillator CCA A1A2, substrate assembly A2A1A1, the PLL control logic, and loop amplifier CCA A2A1A2. The PLL tunes the R-5076/U to the frequency selected by the command word frequency tuning bits controlling the frequency of A1A2 active VCO and A1A1 active tunable filter by adjusting the TV to the VCO and filter.

The VCO output from CCA A1A2 is impedance matched by T1, amplified by U8, and applied as a clock input to two-modulus counter U6, U7. The two-modulus counter divides the VCO frequency by 100 to conform with the units expressed by the frequency tuning bits in the required ratio for the divider. The 100/101 output from A1 to the preset enable input $\overline{PE2}$ synchronizes the counter operation with the substrate assembly frequency logic. Regulated voltage divider Q1, Q2 and associated circuitry raise the counter input to ECL levels and returns the counter output to TTL levels.

Substrate assembly A1 supplies a 1-kHz reference signal (REF OUT) and a frequency variable (divided down VCO frequency) signal (VAR OUT) to phase detector U2. The phase detector evaluates the phase difference between the REF OUT and VAR OUT signals (P and V inputs of U2). When the P and V inputs of U2 have no phase difference (loop locked on frequency), the U and D outputs of U2 will be the same except 180 degrees out of phase with respect to each other. These outputs will appear as a TTL high at the D output and a TTL low at the U output except there will be a narrow pulse (approximately

Table 4-2. Truth Table for Band Decoder PROM U4

FREQ MHz	*1	100	80	40	10	20	8	4	2	OUTPUT				IN (DECIMAL)	OUT (OCTAL)
	*2	6	8	9	10	11	12	13	14						
	*3	15	1	2	3	4	7	6	5						
	*4	A7	A6	A5	A4	A3	A2	A1	A0	Q4	Q3	Q2	Q1		
20		0	0	0	0	1	0	0	0	1	0	0	0	8	10
22		0	0	0	0	1	0	0	1	1	0	0	0	9	10
24		0	0	0	0	1	0	1	0	1	0	0	0	10	10
26		0	0	0	0	1	0	1	1	1	0	0	0	11	10
28		0	0	0	0	1	1	0	0	1	0	0	0	12	10
30		0	0	0	1	1	0	0	0	1	0	0	0	24	10
32		0	0	0	1	1	0	0	1	1	0	0	0	25	10
34		0	0	0	1	1	0	1	0	1	0	0	0	26	10
36		0	0	0	1	1	0	1	1	1	0	0	1	27	11
38		0	0	0	1	1	1	0	0	1	0	0	1	28	11
40		0	0	1	0	0	0	0	0	1	0	0	1	32	11
42		0	0	1	0	0	0	0	1	1	0	0	1	33	11
44		0	0	1	0	0	0	1	0	1	0	0	1	34	11
46		0	0	1	0	0	0	1	1	1	0	0	1	35	11
48		0	0	1	0	0	1	0	0	1	0	0	1	36	11
50		0	0	1	1	0	0	0	0	1	0	0	1	48	11
52		0	0	1	1	0	0	0	1	1	0	0	1	49	11
54		0	0	1	1	0	0	1	0	1	0	0	1	50	11
56		0	0	1	1	0	0	1	1	1	0	0	1	51	11
58		0	0	1	1	0	1	0	0	1	0	0	1	52	11
60		0	0	1	0	1	0	0	0	1	0	1	0	40	12
62		0	0	1	0	1	0	0	1	1	0	1	0	41	12
64		0	0	1	0	1	0	1	0	1	0	1	0	42	12
66		0	0	1	0	1	0	1	1	1	0	1	0	43	12
68		0	0	1	0	1	1	0	0	1	0	1	0	44	12
70		0	0	1	1	1	0	0	0	1	0	1	0	56	12
72		0	0	1	1	1	0	0	1	1	0	1	0	57	12
74		0	0	1	1	1	0	1	0	1	0	1	0	58	12
76		0	0	1	1	1	0	1	1	1	0	1	0	59	12
78		0	0	1	1	1	1	0	0	1	0	1	0	60	12
80		0	1	0	0	0	0	0	0	1	0	1	0	64	12
82		0	1	0	0	0	0	0	1	1	0	1	0	65	12
84		0	1	0	0	0	0	1	0	1	0	1	0	66	12
86		0	1	0	0	0	0	1	1	1	0	1	0	67	12
88		0	1	0	0	0	1	0	0	1	0	1	0	68	12
90		0	1	0	1	0	0	0	0	1	0	1	0	80	12
92		0	1	0	1	0	0	0	1	1	0	1	0	81	12
94		0	1	0	1	0	0	1	0	1	0	1	0	82	12
96		0	1	0	1	0	0	1	1	1	0	1	0	83	12
98		0	1	0	1	0	1	0	0	1	0	1	0	84	12
100		1	0	0	0	0	0	0	0	1	0	1	1	128	13
102		1	0	0	0	0	0	0	1	1	0	1	1	129	13
104		1	0	0	0	0	0	1	0	1	0	1	1	130	13
106		1	0	0	0	0	0	1	1	1	0	1	1	131	13
108		1	0	0	0	0	1	0	0	1	0	1	1	132	13
110		1	0	0	1	0	0	0	0	1	0	1	1	144	13
112		1	0	0	1	0	0	0	1	1	0	1	1	145	13
114		1	0	0	1	0	0	1	0	1	0	1	1	146	13
116		1	0	0	1	0	0	1	1	1	0	1	1	147	13
118		1	0	0	1	0	1	0	0	1	0	1	1	148	13
120		1	0	0	0	1	0	0	0	1	0	1	1	136	13
122		1	0	0	0	1	0	0	1	1	0	1	1	137	13
124		1	0	0	0	1	0	1	0	1	0	1	1	138	13
126		1	0	0	0	1	0	1	1	1	0	1	1	139	13
128		1	0	0	0	1	1	0	0	1	0	1	1	140	13
130		1	0	0	1	1	0	0	0	1	0	1	1	152	13
132		1	0	0	1	1	0	0	1	1	0	1	1	153	13
134		1	0	0	1	1	0	1	0	1	0	1	1	154	13
136		1	0	0	1	1	0	1	1	1	0	1	1	155	13
138		1	0	0	0	0	1	0	0	1	0	1	1	156	13
140		1	0	1	0	0	0	0	0	1	0	1	1	160	13
142		1	0	1	0	0	0	0	1	1	0	1	1	161	13
144		1	0	1	0	0	0	1	0	1	0	1	1	162	13
146		1	0	1	0	0	0	1	1	1	0	1	1	163	13
148		1	0	1	0	0	1	0	0	1	0	1	1	164	13

*1 Frequency Bit Weight
*2 Command Bit
*3 HPROM 1024 Pin Number
*4 HPROM 1024 A Number

100 ns in duration) on each output occurring at a 1-kHz rate. When the loop is locked to a frequency, the U and D outputs cancel in loop amplifier CCA A2A1A2 to effectively instruct the loop amplifier not to change its output voltage. It is the pulse widths of the U and D outputs of U2 that are used by the loop amplifier to set its output voltage and thus determine the VCO frequency.

The pump-up/pump-down logic consists of current sources Q5 and Q6, Q4 and buffer amplifier Q3. The purpose of this logic is to provide variable voltage levels on the U and D inputs to loop amplifier CCA A2A1A2 in response to the high impedance logic level U and D outputs from phase detector U2. The current sources function as variable voltage dividers by varying their conduction, thus varying the voltage levels on the U and D lines. A low logic level pulse on the U2 U output reverse biases CR2 to provide a negative voltage pulse from Q4 to the A2 U input. A low logic level pulse on the U2 D output, through inverter U3D, reverse biases CR3 to provide a positive voltage pulse from Q5 to the A2 D input. Buffer amplifier Q3 controls the voltage levels of the U and D input pulses. The voltage magnitude of the pulses varies in direct proportion to the magnitude of the TV on the tuning voltage feedback output FB from A2. The variable voltage of the control pulses is necessary to compensate for the nonlinear control loop gain variations that occur as a function of tuning voltage. The tuning sensitivity of the varactor diodes in CCA A1A2 is higher at lower voltages (lower tuning frequencies) than at higher voltages (higher tuning frequencies). At the lower frequency end of each band, a 1-MHz change in VCO output requires a 0.15 TV correction; at the higher end of the band, a 1-MHz change in VCO output requires a 1.0 TV correction.

4.3.2.1.4 Loop Amplifier CCA A2A1A2. Loop amplifier CCA A2A1A2 (see figures 4-9 and FO-8) contains an integrated power amplifier (U1 and C4) with an output voltage range of +2 to +30 volts. The amplifier output voltage (TV OUT) remains constant until either positive (down) or negative (up) pulses are applied to its D or U inputs. Both D and U pulses are applied to the amplifier inverting input; the positive D pulses decrease the TV OUT voltage and negative U pulses increase the TV OUT voltage. The magnitude of the voltage change on the TV OUT line is directly proportional to the magnitude and pulse duration of the input pulses. The pump-up/pump-down logic controls the magnitude. The phase detector initiates and controls the duration of the input pulses. The TV OUT line supplies the R-5076/U tuning voltage. The TV FEEDBACK (FB) to the pump-up/pump-down logic compensates for the non-linear frequency versus TV response of the varactors used in the VCO and preselector. The actual input voltage to the U1 circuitry appears at the CR1, CR2, R1 junction and is a function of the current through summing resistors R1 and R2 with the polarity of voltage determined by the direction of current flow. Loop BW control is provided by R6, R7, and C5 in the amplifier feedback circuit. Integrating capacitor C4 in the feedback circuit is charged and discharged by the input pulses and holds the amplifier output constant when no pulses are occurring. Diodes CR3 and CR4 reduce C4 leakage.

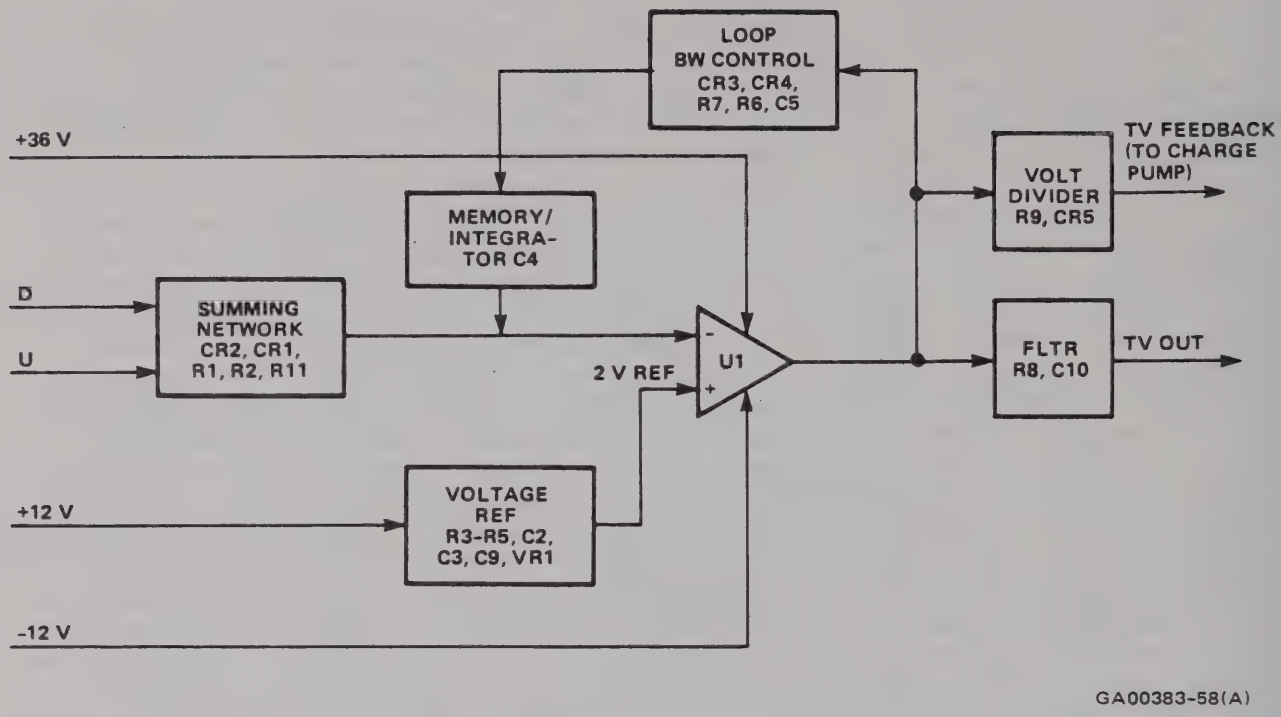


Figure 4-9. Loop Amplifier CCA A2A1A2

4.3.2.2 DECODER CCA A2A2. (See figures 4-10 and FO-9.) Decoder CCA A2A2 consists of general-purpose circuitry and substrate assembly A2A2A1. The circuits comprise input and output buffers for control bits to and from A2A2A1 (U1 and U4), -15 to -12 volt regulator U3, and potentiometer R14 to control the amount of MGC offset, D/A converter U5, power switch Q1 for the RF test circuit, and power switches Q2, Q3, and Q4 for the IF circuits. D/A converter U5 is not used in this application of the R-5076/U.

4.3.2.2.1 10.7/30 MHz IF Switch Driver. IF select switch Q2 detects either a logic 0 (10.7 MHz) or a logic level 1 (30 MHz) on the 10.7/30-MHz line from the HPROM in substrate assembly A2A1A1. A logic 0 turns Q2 off and turns Q4 on to produce an output on the 10.7-MHz line to first IF amplifier/detector CCA A3A1. A logic 1 turns Q2 on, which turns Q3 on to produce an output on the 30-MHz line to CCA A3A1. Bit 7 from synthesizer CCA A2A1 is buffered by U4C and output to second IF amplifier/detector CCA A3A2 as the squelch control signal.

4.3.2.2.2 Substrate Assembly A2A2A1. (See figures 4-11 and FO-9.) Substrate assembly (CAM-02) A2A2A1 consists of shift registers, holding latches, and various decoding and switching circuits. The 51 bits of serial data from the tuning command word are input on the SERIAL DATA IN line and shifted through 24 stages of shift registers

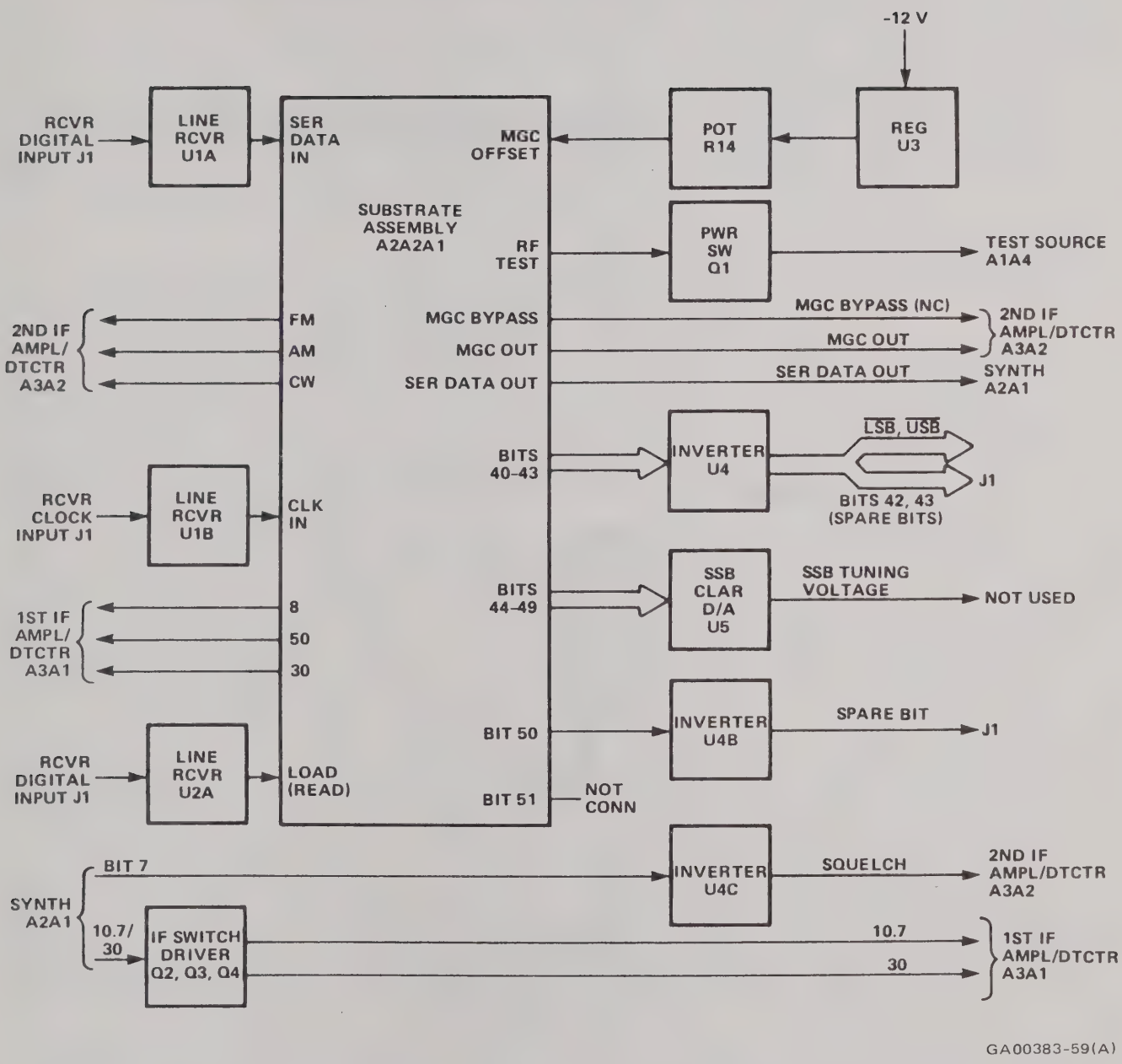


Figure 4-10. Decoder CCA A2A2 Block Diagram

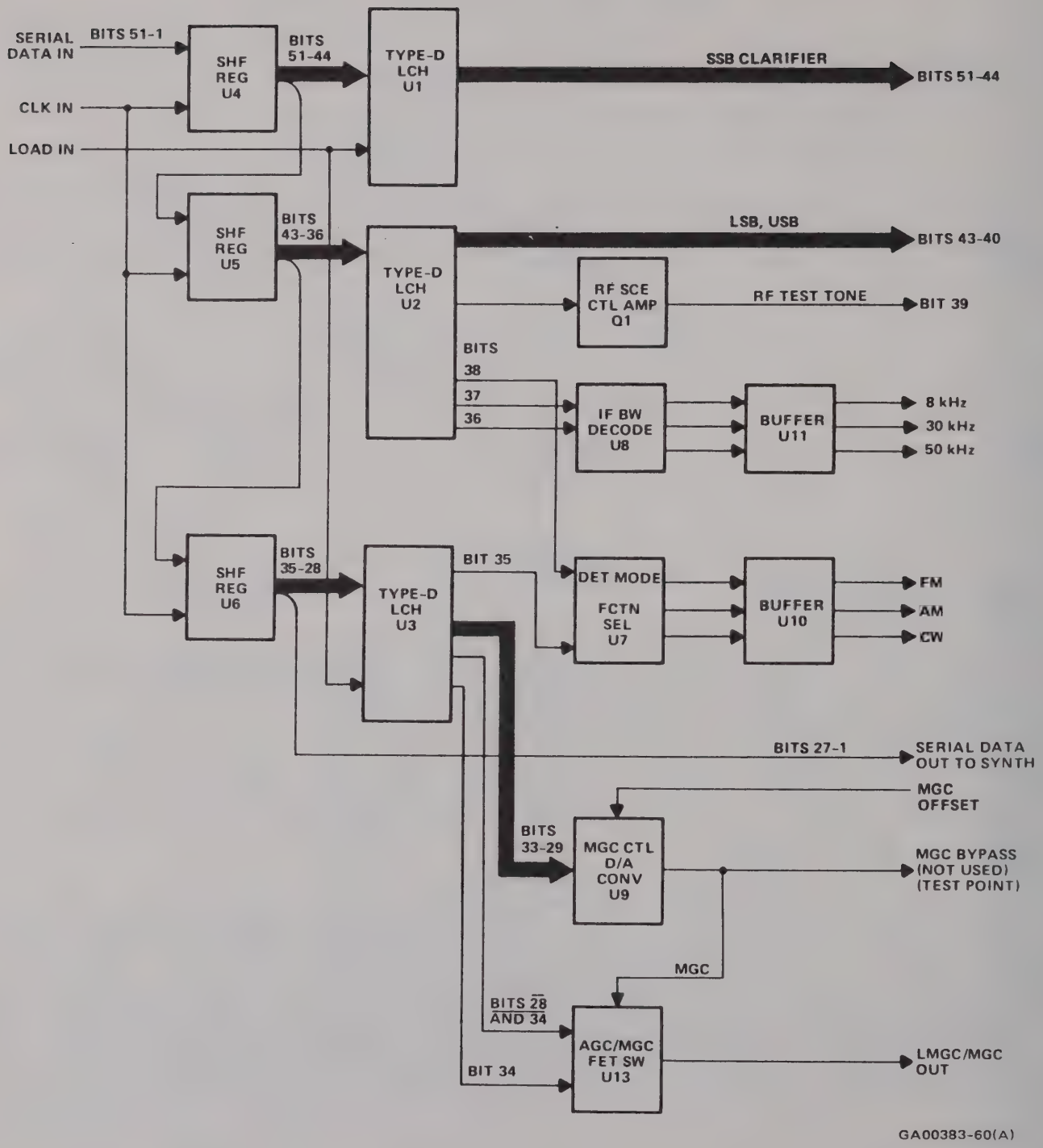


Figure 4-11. Substrate Assembly A2A2A1 (CAM-02)

U4, U5, and U6 to collect control bits 51 thru 28. The higher-order bits 27 thru 1, representing frequency tuning and control, are passed to synthesizer CCA A2A1 over the DATA OUT line. The parallel outputs from the shift registers are gated into latch registers U1, U2, and U3 by a load pulse on the CLK IN line.

Bits 51 thru 42 are not used in this application of the R-5076/U. Bit 39 (Test Tone) goes high to turn on Q1, which activates test source CCA A1A4 to produce test tones. Bits 38 and 35 are input to function select decoder U7 to produce FM, AM, or CW function outputs that activate corresponding discriminator/detector circuits in second IF amplifier CCA A3A2. Bits 37 and 36 are routed to IF bandwidth decoder U8 to generate selected IF bandwidths of 8, 30, or 50 kHz. These signals are sent to first IF amplifier/detector CCA A3A1 to activate corresponding bandwidth selection filters.

Bits 34 and 28 specify the type of gain control selected by U13. Bits 29 thru 33 specify the magnitude of the MGC voltage generated by U9 for use in both the MGC and LMGC modes.

D/A converter U9 converts the digital control input supplied by bits 29 thru 33 to an analog negative voltage output. The MGC OFFSET selected by potentiometer R14 (figure 4-10) determines the output voltage range. Table 4-1 shows the binary weights assigned to each of the five control bits. The U9 MGC voltage is supplied to mode selector switch U13.

Field-effect transistor (FET) switch U13 selects the receiver gain control mode by connecting the analog output voltage from digital-to-analog converter U9 to the LMGC/MGC OUT line to the second IF amplifier MGC/LMGC/AGC circuitry on CCA A3A2 (refer to paragraph 4.3.3.2). When control bits 34 and 28 are low, U13 selects the AGC mode by disconnecting the U9 MGC voltage output from the MGC OUT line. In the AGC mode, the AGC circuitry provides total gain control. When bit 28 is high and bit 34 is low, U13 selects the MGC mode by connecting the U9 MGC voltage directly to the MGC OUT line. The U9 low-impedance output voltage overrides the AGC high-impedance circuitry to control the receiver gain. When bit 34 is high (LMGC select), U13 selects the LMGC mode by switching a diode in series with the MGC OUT line. As long as the AGC voltage, sensed from CCA A3A2 on the MGC OUT line, is more positive than the selected MGC output from U9, the diode conducts, permitting the U9 MGC voltage to control the gain. Whenever a strong RF signal causes the AGC voltage to go more negative than the U9 MGC output, the diode becomes reverse biased, permitting the AGC voltage to reduce the gain.

4.3.3 FIRST AND SECOND IF AMPLIFIER/DETECTOR ECA A3.

4.3.3.1 FIRST IF AMPLIFIER CCA A3A1. (See figures 4-12 and FO-10.)

The signal at E1 received from first mixer IF CCA A1A3 is either 10.7 MHz or 30 MHz. When it is 10.7 MHz (bands 1 and 2), the switches are controlled by +5 V at the 10.7-MHz IF switch line E3. At the

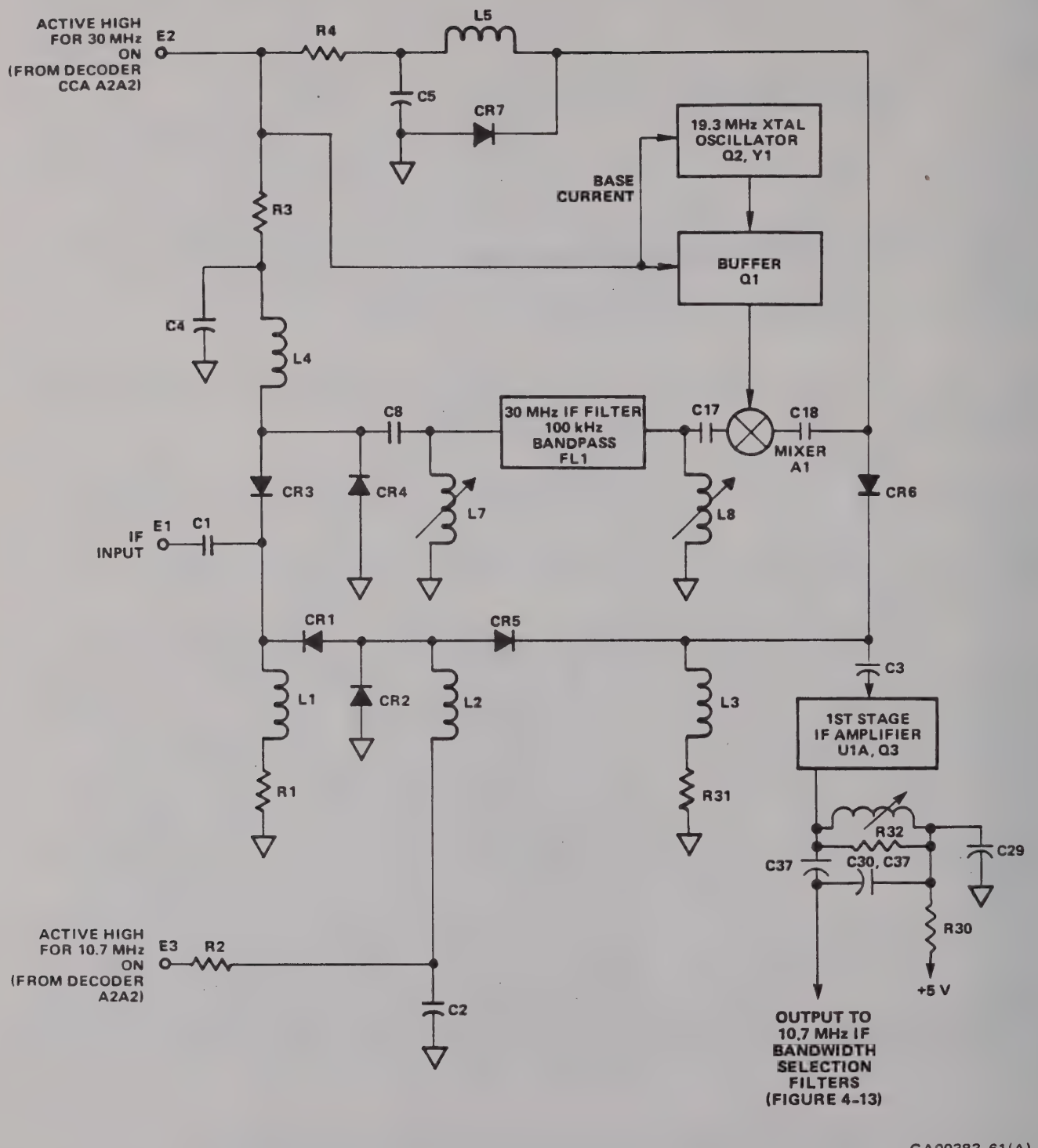


Figure 4-12. 30-MHz Down Converter and First-Stage IF Amplifier CCA A3A1 Block Diagram

same time, -15 V appears at the 30-MHz IF switch line E2. These voltages come from decoder CCA A2A2. Oscillator Q2 is turned off by the negative voltage on E2, preventing operation of mixer A1. The signal flow is routed from IF input E1 through C1, CR1, CR5, and C3 to the first stage of IF amplifier Q3. The first-stage IF amplifier is routed to the bandwidth filter switches. U1A optimizes the gate voltage on FET Q3 for the signal strength of the input.

The path of the 30-MHz input is through C1, CR3, and C8; 30-MHz filter FL1; and C17 to mixer A1. It is then down-converted in the mixer by the 19.3-MHz signal from oscillator Q2. This operation takes place with +5 V on E2. The 30-MHz signal is down-converted to 10.7 MHz and routed through C18, CR6, C3, and the first-stage IF amplifier to the IF bandwidth selection filters.

Filter FL1 is a 30-MHz, four-pole crystal filter that reduces the IF bandwidth to 100 kHz before mixing takes place in mixer A1. This bandwidth reduction keeps strong out-of-band signals from producing undesirable mixing products within A1.

The 10.7-MHz signal from the first-stage IF amplifier is routed through one of the three IF bandwidth filter circuits to second-stage IF amplifier Q9 (see figures 4-13 and FO-10). The bandwidth selected determines the path the signal takes. Zero voltage on a particular switch input (E5, E8, or E9) turns its associated switch ON. The decoding logic is such that all switch voltages except the selected bandwidth switch are at +5 V. Assuming that the 8-kHz bandwidth is selected, a 0 voltage appears at input E9. This causes Q4 to conduct, which in turn causes CR16 and CR18 to conduct. With CR16 and CR18 conducting, a low impedance is presented to the signal, allowing it to be passed with little attenuation.

The other series diode switches (CR8, CR11, CR12, and CR14) are reverse-biased, preventing the signal from flowing. The shunt diodes (CR9, CR10, CR13, and CR15) are conducting, shorting the attenuated signal to ground. Thus the signal can flow only through 8-kHz filter FL2. The tuned circuits on the filter terminals provide matching for the filters.

The filtered 10.7-MHz RF signal is routed through second-stage IF amplifier Q9 and Q7, and is applied to buffer amplifier Q11. The output of amplifier Q11 is routed to SSB adapter ECA A4 (refer to paragraph 4.3.4). The 10.7-MHz signal from SSB adapter ECA A4 is received at terminal E10 of CCA A3A1. The 10.7-MHz signal is then buffered by Q12 and routed to second IF amplifier CCA A3A2 from terminal E13.

Q7 and Q10 amplifier gains are controlled by the AGC voltage from second IF amplifier/detector CCA A3A2. Q8 and U1B automatically adjust the gate voltage of Q9 according to the AGC voltage. A more positive AGC voltage at E4 (weaker signal strength received) forces the emitter of Q7 to go more positive, which causes pin 5 of U1B to go more negative. This reduces the gate voltage to Q9, allowing Q9

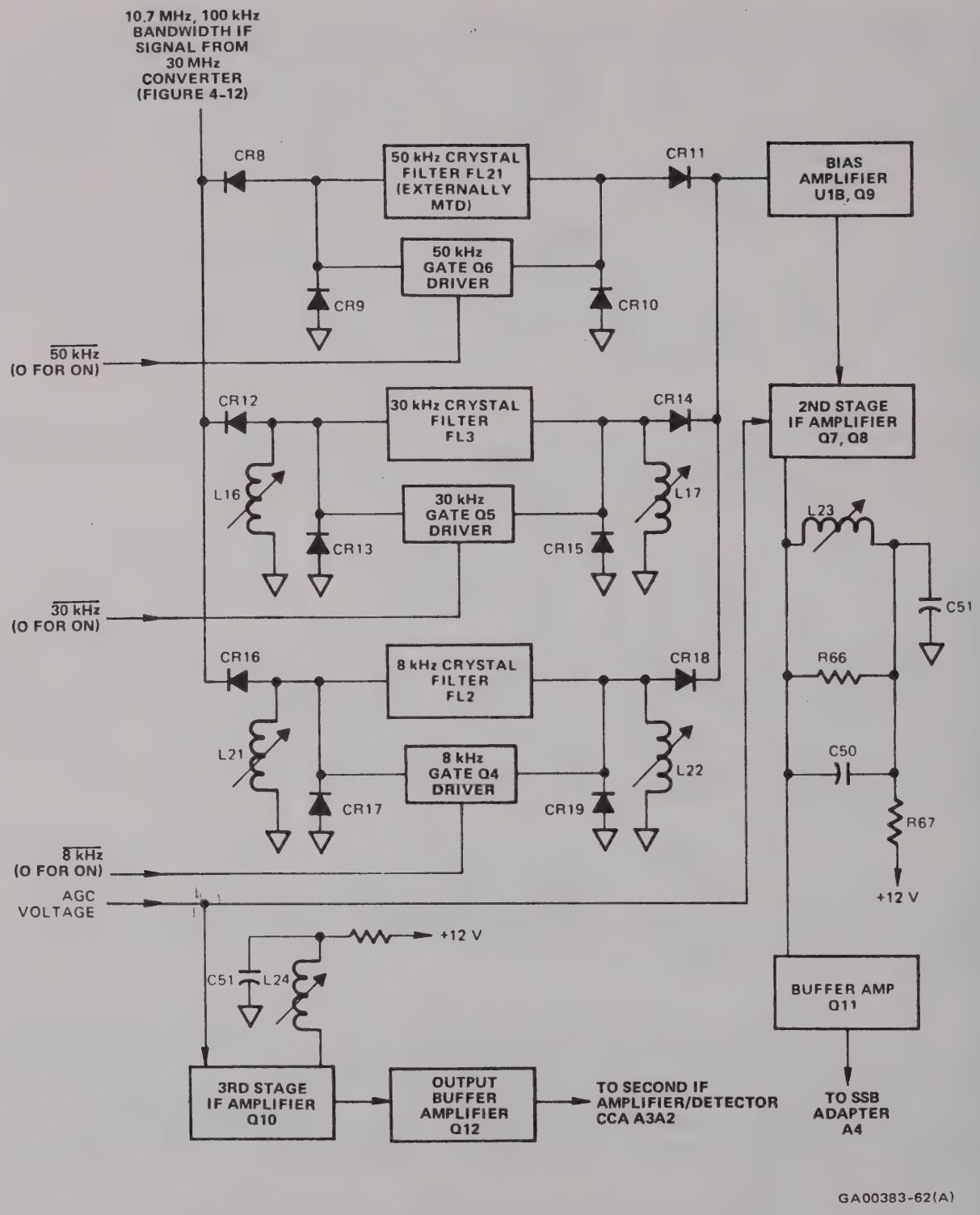


Figure 4-13. IF Filters, Second-Stage IF, and Third-Stage IF Amplifier Block Diagram

to operate under weak signal conditions and reducing the noise produced by Q9. The tuning of the IF amplifier is adjusted by L23 and L24.

4.3.3.2 SECOND IF AMPLIFIER/DETECTOR CCA A3A2. Second IF amplifier/detector CCA A3A2 consists of an IF amplifier, AM and CW detectors, FM discriminator, AGC/MGC/LMGC, tuning indicator amplifier, squelch, automatic level control (ALC), beat frequency oscillator (BFO), and audio output circuitry.

The first- and second-stage IF amplifiers and detectors are shown in figures 4-14 and FO-11. The IF signal is amplified by first-stage IF amplifier Q1 and Q2. Adjusting L1 tunes the stage. Second-stage IF amplifier Q3 and Q4 provides AGC-controlled amplification and impedance matching for the filter. L2 tunes this stage. Crystal filter FL1 is a simple two-stage crystal filter that reduces the amplified (out-of-IF-band) noise of the IF amplifiers. Output matching of this filter is accomplished by adjusting L3. The signal is buffered by Q5 and sent to AM IF buffer Q7 and to broadband amplifier Q6. The AM buffer is tuned by L5. FM/CW buffer Q6 is not tuned.

AM detection is accomplished by CR13 and is filtered by C23. L14 provides a bias path for CR13. Dc amplifier U1A amplifies the envelope-detected AM signal. The output of the amplifier is sent to the AGC circuits and to amplifier U1B, which provides the receiver DF audio output. The output of U1A buffers the detected AM signal.

The broadband buffer Q6 output is fed to limiter-discriminator amplifier U2. T1 and C61 are the discriminator adjustments and L7 provides phase shift for the discriminator. Test points E5 and E6 provide meter terminals for adjusting C61.

CW signals are routed via buffer amplifier Q6 through product detector Q10, which mixes the CW signal with the 10.7-MHz signal generated by the BFO consisting of Q11 and Y1. The output of the mixer is the difference between the CW signal and the 10.7 MHz that is sent to the detector switch.

The MGC/LMGC/AGC, ALC, tuning indicator, squelch, and audio output circuitry is shown in figures 4-15 and FO-11. The detected receiver IF signal from the AM detector (CR13 and U1A) is received by mode-select switch U3 and the MGC/LMGC/AGC circuit consisting of U1C, CR7, Q8, and Q9. CR7 rectifies the AM audio signal to a positive-going signal. U1C amplifies and integrates the rectified audio signal voltage for output. Transistor Q8 provides a negative feedback path that limits the output of U1C to +8 V dc.

Amplifier U1D receives the AGC voltage and provides a 0- to 5-V analog output used for a squelch activation voltage and a tuning indicator output (E18). Amplifier U5 provides an audio enable signal to U3, in accordance with the squelch control. The less positive the squelch control voltage becomes, the lower the positive voltage is at

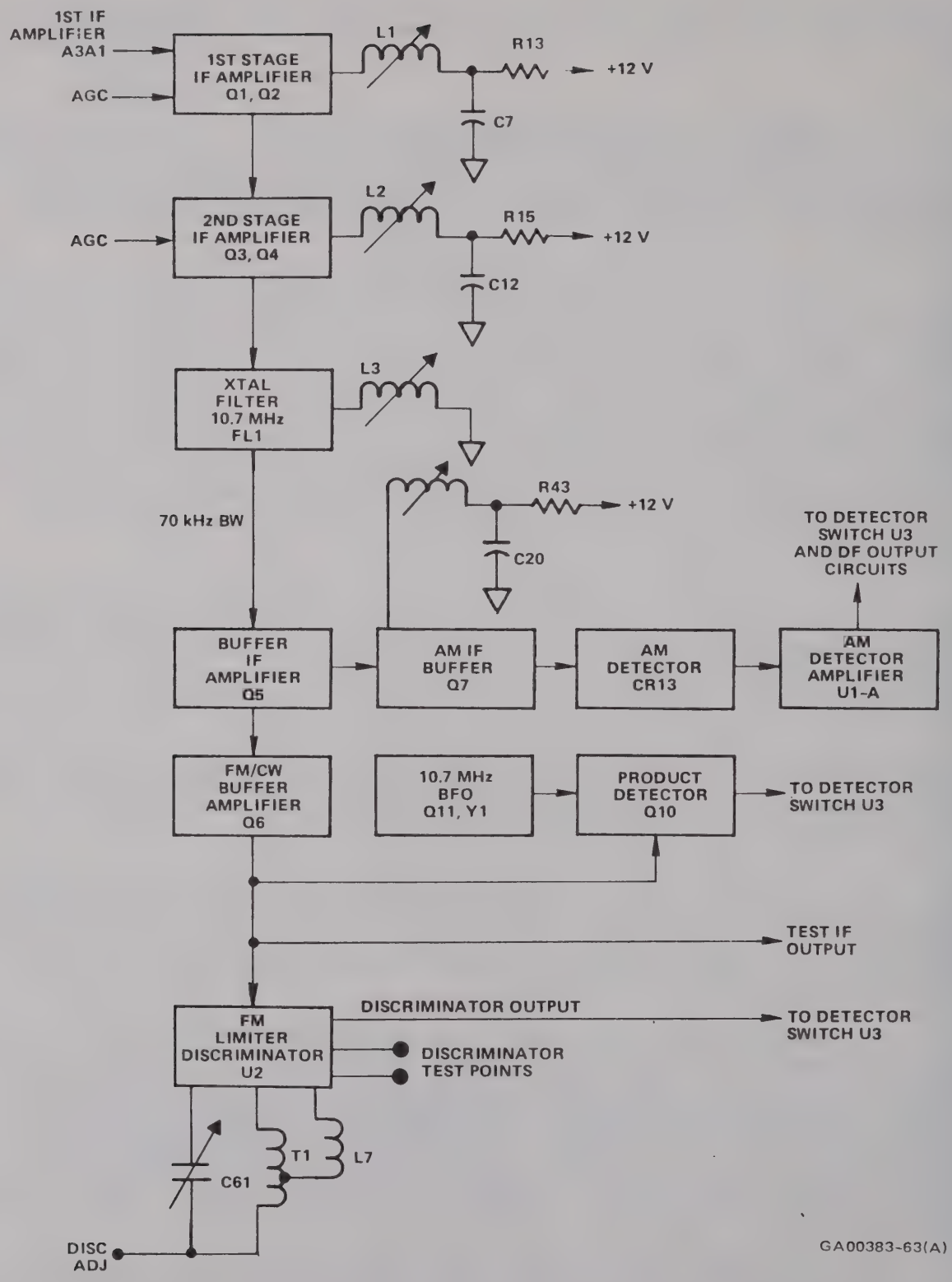


Figure 4-14. Second IF Amplifier/Detector CCA A3A2 Block Diagram

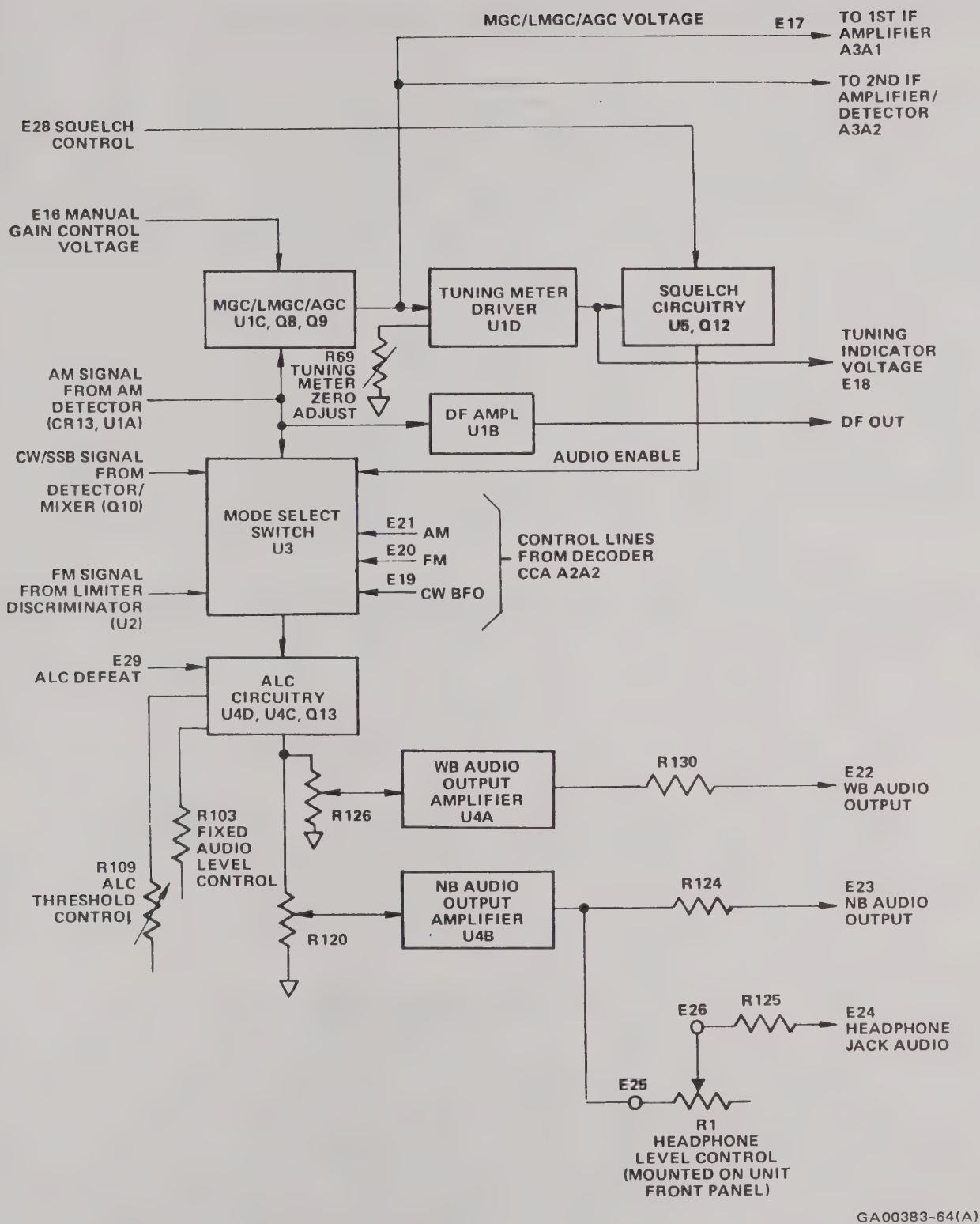


Figure 4-15. MGC/AGC, ALC, Tuning Indicator, Squelch, and Audio Output Circuitry

the output of U5, until U3 becomes disabled, allowing no signal output to be routed from U3 to U4D of the ALC circuit.

Mode select switch U3 operates under control of the audio enable signal from U5 and the AM, FM, CW control signals from decoder CCA A2A2. When control line AM, FM, or CW and the audio enable at U3 pin 14 are high, the selected R-5076/U audio signal is routed to the ALC circuit consisting of U4D, U4C, and limiter Q13. The output amplitude of the audio signal from U4D is governed by the audio limiter path through U4C and Q13. U4C, when gain-adjusted through R109, sets a maximum limit on the audio output level of U4D (ALC threshold). Q13 then limits the audio amplitude at the output of U4D in accordance with the maximum amplitude level, or ALC threshold, as set by U4C. If the ALC defeat input at E29 is grounded, the output of U4C goes to ground, causing the feedback path through audio limiter Q13 to be disabled. U4D is a unity-gain device, and as such does not provide any audio signal gain. The output of U4D is adjusted by the negative feedback path only, and is applied to audio amplifiers U4A and U4B, which in turn output the receiver wideband and narrowband audio, respectively. The narrowband audio is routed through front-panel-mounted headphone gain control potentiometer R1 back to E26, through R125, and out to the R-5076/U headphone jack from terminal E24.

The BFO consists of the circuitry shown in figures 4-16 and FO-11. CW reception uses the BFO circuit to mix two signals to produce an audible beat note. The frequency of the BFO is fixed at 10.7

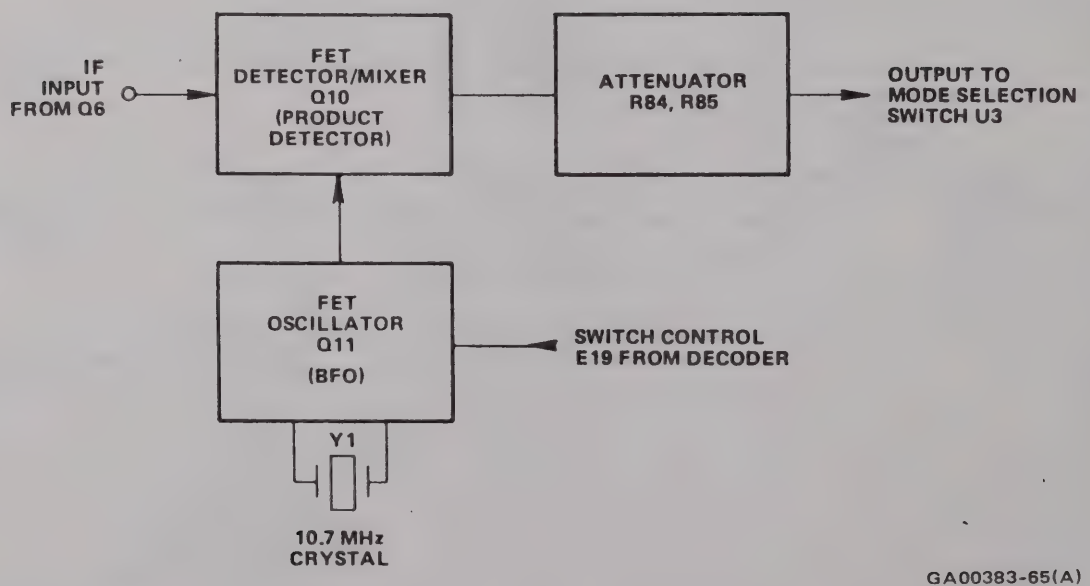


Figure 4-16. CW Detector Block Diagram

MHz. Thus, for an input signal that produces exactly a 10.700-MHz IF signal, a zero beat occurs. When the receiver is tuned to produce an IF signal of 10.701 MHz (±1 kHz), a 1-kHz tone results. For any other IF frequency, a tone other than 1 kHz results.

The oscillator circuit, composed of Q11 and crystal Y1, is activated by an input at E19 from decoder CCA A2A2 and operates only in the CW mode (see figure 4-16). The oscillator output is then routed to FET detector/mixer Q10. The Q10 input is received from the IF stage and its output is attenuated by R84 and R85 to obtain the proper level for the ALC circuits.

4.3.4 SINGLE-SIDEBAND (SSB) ADAPTER ECA A4.

4.3.4.1 SSB CCA A4A1. (See figures 4-17 and FO-12.) SSB CCA A4A1 consists of bit decoder U1A; upper sideband mixer Q2, lower sideband mixer Q3, and switch Q4; a 10.7-MHz to 500-kHz down-converter; voltage-controlled crystal oscillator U1B, Y1, Q1, CR2, and CR3; SSB filters FL1 and FL2; LSB mixer Q6, USB mixer Q7; a 500-kHz to 10.7-MHz up-converter; 10.2-MHz oscillator Y2, Q5; bandpass filter L1, L2, FL3, C22, and C25; switches Q8 and Q9; and amplifier Q10.

Decoder CCA A2A2 receives control bits 41 (USB control) and 40 (LSB control), which places the receiver into the USB, LSB, or AM, FM, and CW modes of operation. With bit 41 and/or bit 40 low (active), the control signal (USB and/or LSB) is decoded by gate U1A and is applied to the down-converter circuit (10.7 to 0.5 MHz). The down-converter circuit includes a modified Pierce oscillator consisting of crystal oscillator U1B and Y1 (11.2 MHz), emitter-follower transistor Q1, varactor diodes CR2 and CR3, and associated circuitry.

The oscillator frequency is controlled by the varactor diodes, which are controlled by the clarifier voltage (tuning voltage) signal received from decoder CCA A2A2. The tuning voltage has a range of +1.0 ±0.2 V dc to +6.0 ±1.0 V dc. IF frequency shifts the 11.2-MHz down-converter oscillator a total of 2 kHz ±400 Hz with a 6-bit resolution (see table 4-1) for fine tuning the SSB adapter.

The USB/LSB commands are gated by U1A, which enables VCO gate and control gates U1C and U1D. The VCO signal is first inverted and phase split by inverters U2A and U2B, then gated by U1C and U1D and inverted by U2C and U2D. This signal then controls mixer transistors Q2 (USB) and Q3 (LSB). The turning on of the transistors allows the mixing products of the VCO and the 1st IF signal received from 1st IF amplifier CCA A3A1 to be applied to the appropriate USB (FL1) and/or LSB (FL2) filter. These filters have a low bandpass ripple (2 to 3 dB) and a bandpass at 6 dB points of 3.2-kHz to select the frequency difference from the mixing products of the VCO and 1st IF signals.

The LO signal gated at U1C and/or U1D is also applied for integration and comparison at operational amplifier U4. The amplifier

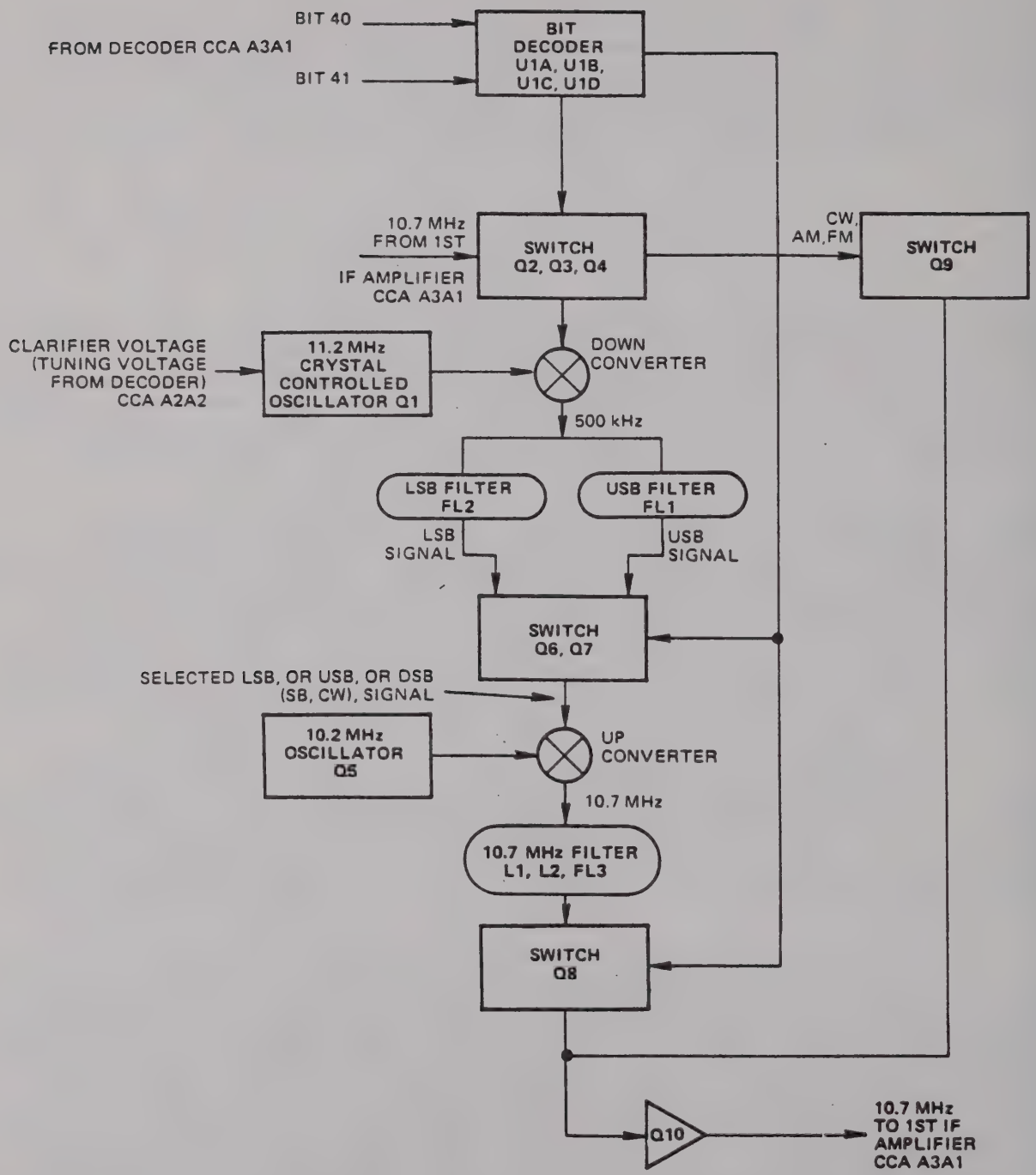


Figure 4-17. Single-Sideband CCA A4A1 Block Diagram

output is applied to the Pierce oscillator circuit as a waveform symmetry feedback control signal.

The USB and/or LSB filter outputs are applied to two dual gate FET mixer circuits (Q6 for LSB, Q7 for USB), the selected FET being enabled by the inverted (U3A thru U3D) $\overline{\text{LSB}}$ or $\overline{\text{USB}}$ control signals received from decoder CCA A2A2. The mixer drive to FETs Q6 and Q7 is supplied by the up-converter oscillator. The up-converter oscillator consists of crystal Y2 (10.2 MHz), FET Q5, and associated circuitry. Up-converter FET oscillator Q5 is enabled by the inverted (U3E) USB and/or LSB control signal from gate U1A, while the frequency is controlled by crystal Y2.

The output of the selected dual gate FET (Q6 or Q7) is routed through the tuned circuits consisting of L1, C22 and L2, C25, and 10.7-MHz filter FL3 network. This circuit filters out the local oscillator signal. From the filter network, the selected SSB signal is passed to FET Q8. Q8 is enabled by the inverted (U3E) USB and/or LSB control signal received from gate U1A. The resultant output signal from Q8 is routed via buffer amplifier Q10 and associated circuitry, to 1st IF amplifier CCA A3A1.

With AM, FM, or CW selected, control signals $\overline{\overline{\text{USB}}}$ and $\overline{\overline{\text{LSB}}}$ are high and the inverted gate output (U1A) turns off SSB mixer transistors Q2 and Q3. FM/AM/CW switching transistor Q4 is turned on. Consequently, the 1st IF signal received from 1st IF amplifier CCA A3A1 will be passed without SSB processing, via enabled FM/AM/CW mode transistor switch Q9 and buffer amplifier Q10 to 1st IF amplifier CCA A3A1.

SECTION V

MAINTENANCE

5.1 GENERAL.

This section provides maintenance procedures for the R-5076/U. Included in the section are a list of required equipment, preventive maintenance, troubleshooting and test procedures, and alignment and adjustment procedures.

5.2 TEST EQUIPMENT REQUIRED.

The test equipment required to maintain the R-5076/U is listed in table 5-1. If the model numbers specified are not available, equivalent models may be substituted.

Table 5-1. Test Equipment Required

Equipment	Manufacturer/Model	Use
RF Signal Generator	Hewlett-Packard 8640B	Generates waveform
Oscilloscope	Tektronix 7623A	Waveform measurement
RMS Voltmeter	Hewlett-Packard 3400A	RMS voltage measurement
Digital Multimeter	John Fluke 8600A	Voltage measurements
Receiver Test Set	ESL 10-151315	Receiver testing
Tracking Generator	Hewlett-Packard 8444A	Signal generation
Spectrum Analyzer	Hewlett-Packard 141T	Waveform analysis
IF Plug-In	Hewlett-Packard 8552B	
RF Plug-In	Hewlett-Packard 8553B	
Frequency Counter	Hewlett-Packard 5340A	Frequency measurements
Mixer	Relcom M1A	Frequency conversions
VHF Attenuator	Hewlett-Packard 355D	RF level attenuations
Power Supply	Hewlett-Packard 6269B	Tuning voltage (SSB)

5.3 PREVENTIVE MAINTENANCE.

Preventive maintenance and services of the R-5076/U are performed at daily, weekly and monthly intervals.

5.3.1 DAILY PREVENTIVE MAINTENANCE.

The necessary daily preventive maintenance checks and services to be performed on the R-5076/U are listed and described in table 5-2.

5.3.2 WEEKLY PREVENTIVE MAINTENANCE.

The necessary weekly preventive maintenance checks and services to be performed on the R-5076/U are listed and described in table 5-3.

5.3.3 MONTHLY PREVENTIVE MAINTENANCE.

Perform all monthly preventive maintenance checks and services listed in table 5-4 once each month in the sequence listed.

5.4 OPERATIONAL TEST.

This paragraph provides operational test procedures for the R-5076/U. The test procedures, outlined in table 5-5, indicate if a receiver is operational.

5.5 PERFORMANCE TEST.

This paragraph provides performance test procedures for the R-5076/U. The test procedures indicate if a new or repaired receiver is functioning properly.

NOTE

Table 5-6 is used to confirm proper receiver operation and as a troubleshooting aid. The procedures listed in table 5-6 require the Receiver Test Set (RTS) P/N 10-151315. If the RTS is not available, perform the procedures listed in table B-2.

When a receiver malfunctions, it should be tested as outlined in table 5-6. The results of each test should be written down for use during the troubleshooting procedures.

Table 5-2. Daily Preventive Maintenance Checks and Services

Step	Item	Procedure
1	Cable	Visually inspect all exterior cables for kinks and strained, cut, frayed, or otherwise damaged insulation. NOTE Report any abnormal conditions to direct support maintenance.
2	Cleanliness	Make sure exterior surfaces of the unit are clean. If necessary, clean exterior surfaces as follows: a. Remove dust and loose dirt with a clean, soft cloth. b. Remove dust or dirt from plugs and jacks with a brush. WARNING The fumes of trichloroethane are toxic. Provide thorough ventilation whenever used. DO NOT USE NEAR OPEN FLAME. c. Remove grease, fungus, and ground-in dirt using a cloth dampened (not wet) with trichloroethane.

Table 5-3. Weekly Preventive Maintenance Checks and Services

Step	Item	Procedure
1	Corrosion	Make sure exterior surfaces of unit are free of rust and corrosion.
2	Functional test	Perform the test procedures listed in paragraph 5.4.

Table 5-4. Monthly Preventive Maintenance Checks and Services

Step	Item	Procedure
1	Cleanliness	Make sure exterior surfaces of the unit are clean. If necessary, proceed as directed in table 5-2, step 2.
2	Preservation	Inspect exterior surfaces of the unit for chipped paint or corrosion. If necessary, spot-paint surfaces as follows: a. Remove rust and corrosion from metal surfaces by lightly sanding them with no. 000 sandpaper. b. Brush two coats of paint on bare metal to protect it from further corrosion.
3	Interconnecting cables	Inspect unit interconnecting cables for loose, broken, or otherwise damaged connections. NOTE Higher category maintenance is required for repair or replacement of all cables.
4	Functional test	Perform test procedures described in paragraph 5.4.

Table 5-5. Radio Receiver R-5076/U Operational Test

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
			CAUTION Verify that power is not applied to test equipment during test setup. FM Reception Test			
1	NA	Headset Oscilloscope 7623A Receiver Test Set (RTS) RF Signal Generator 8640B	a. Establish test setup as shown in figure 5-1. b. On RTS, set controls as follows: (1) SDU toggle switch down (off). (2) MGC/AGC toggle switch down. (3) BFO toggle switch down (off). (4) IF BW toggle switch to wide (left switch up = 1, right switch down = 0). (5) AM/FM toggle switch down (FM mode). (6) TST TNS toggle switch up (tone on). (7) ALC toggle switch down (off). (8) SQUELCH toggle switch down (off).			

Table 5-5. Radio Receiver R-5076/U Operational Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
2	AUDIO BNC jack on RTS. AUDIO head-phone jack on RTS.	Same as step 1.	a. Connect oscilloscope to test point listed in figure 5-2. b. Connect headset to the AUDIO headphone jack on the RTS. c. On RTS, set AC POWER switch to ON. d. Apply power to test equipment. NOTE The RTS leverwheel switches are used to tune the receiver to the desired frequency. Each incremental position of the switches is assigned the following values: A = 100 MHz Times B = 10 MHz the C = 1 MHz face D = 0.1 MHz value E = 0.01 MHz of the F = 0.001 MHz switch			

Table 5-5. Radio Receiver R-5076/U Operational Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
3	AUDIO BNC jack on RTS.	Same as step 1.	a. Tune receiver to 21 MHz. (A = 0, B = 2, C = 1, D = 0, E = 0, and F = 0.)			
			b. Observe oscilloscope while listening to the headset.	A 1-kHz test tone should be heard in the headset and seen on the oscilloscope.	Proceed with step 4.	Run performance test. (Refer to table 5-6.)
4	AUDIO BNC jack on RTS.	Same as step 1.	a. Tune receiver to 41 MHz, 61 MHz, 81 MHz, 101 MHz, 121 MHz, and 141 MHz.			
			b. Observe oscilloscope while listening to the headset.	A 1-kHz test tone should be heard in the headset and seen on the oscilloscope.	Proceed with step 5.	Run performance test. (Refer to table 5-6.)
5	AUDIO BNC jack on RTS.	Same as step 1.	a. Tune receiver to 139 MHz, 119 MHz, 99 MHz, 79 MHz, 59 MHz, and 39 MHz.			
			b. Observe oscilloscope while listening to the headset.	A 1-kHz test tone should be heard in the headset and seen on the oscilloscope.	Proceed with step 6.	Run performance test. (Refer to table 5-6.)

Table 5-5. Radio Receiver R-5076/U Operational Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
6	AUDIO BNC jack on RTS.	Same as step 1.	a. On RTS, set BFO toggle switch up (on). b. Tune receiver to 20 MHz, 40 MHz, 60 MHz, 80 MHz, 100 MHz, 120 MHz, and 140 MHz. b. Observe oscilloscope while listening to the headset.	A test tone of less than 1 kHz should be heard in the headset and seen on the oscilloscope. NOTE The frequency of the test tone depends on the difference between the BFO frequency and the test tone RF carrier frequency that is down converted to a 10.7 MHz IF frequency.	Proceed with step 7.	Run performance test. (Refer to table 5-6.)

Table 5-5. Radio Receiver R-5076/U Operational Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
			AM Detection Test			
7	AUDIO BNC jack on RTS.	Same as step 1. RF Signal Generator 8640B	a. On RTS, set controls as follows: (1) BFO toggle switch down (off). (2) AM/FM toggle switch up (AM mode). (3) TST TNS toggle switch down (tone off). b. Set RF signal generator as follows: (1) Frequency: 20 MHz (2) Output Level: -10 to -80 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz. c. Connect RF signal generator output to receiver RF input.			

Table 5-5. Radio Receiver R-5076/U Operational Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
7 (cont)			d. Observe oscilloscope while listening to the headset.	A 1-kHz test tone should be heard in the headset and seen on the oscilloscope.	Operational test complete.	Run performance test. (Refer to table 5-6.)

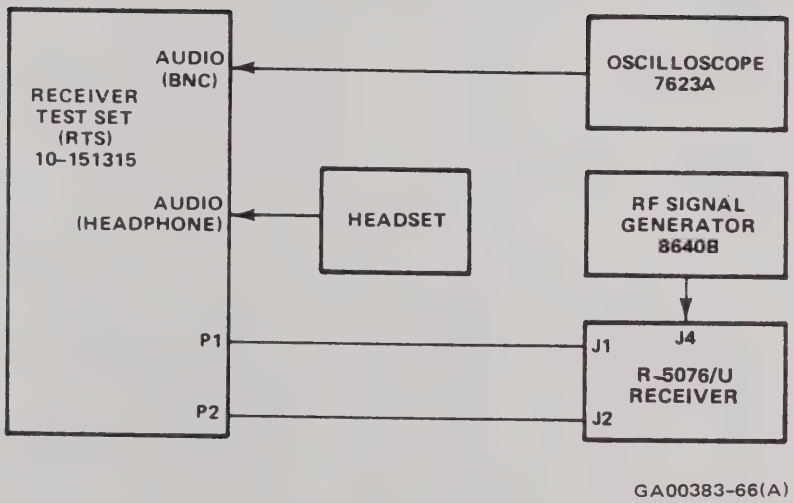


Figure 5-1. Operation Test Setup

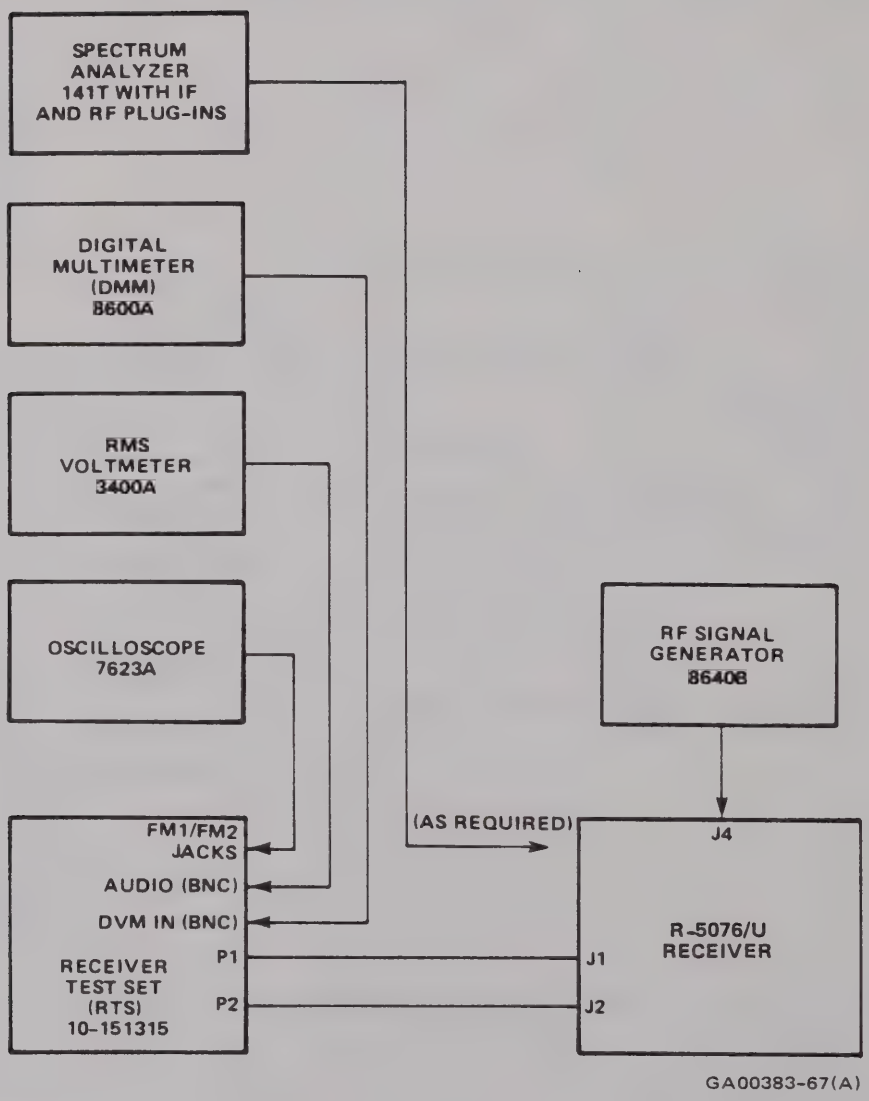


Figure 5-2. Performance Test Equipment Setup

Table 5-6. Radio Receiver R-5076/U Performance Test

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
			CAUTION Ensure that power is not applied to test equipment during test setup. AM Sensitivity Test			
1	NA	RF Signal Generator 8640B RMS Voltmeter 3400A Oscilloscope 7623A Digital Multimeter (DMM) 260 Receiver Test Set (RTS)	a. Establish test setup as shown in figure 5-2. b. On RTS, set all leverwheel switches to 0. c. On RTS, set all toggle switches down.			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
1 (Cont)		Power Supply HP6269B Spectrum Analyzer 141T with IF plug-in 8552B and RF plug-in 8553B				
2	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS AC POWER to ON. b. Apply power to test equipment. c. On RTS, set controls as follows: (1) MGC/AGC toggle switch up (MGC on). (2) AM/FM toggle switch up (AM mode). (3) IF BW toggle switches to Narrow (left switch down = 0, right switch down = 0).			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
2 (Cont)			(4) Leverwheel switch B to 2 (20.000 MHz). d. Set RF signal generator as follows: (1) Frequency: 20.000 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz e. Set RTS MGC toggle switches for a maximum indication on the RMS voltmeter. Record level.	-10 (±5) dB	____dB. Note dB level and proceed with step 3.	
3	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator AM switch to OFF. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 2, -30 (±5)dB typical.	Proceed with with step 4.	ECA A1, A2, or A3 defective.

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
4	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS leverwheel switch C to 8. b. Set RF signal generator as follows: (1) Frequency: 28.000 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz c. Set RTS MGC toggle switches for a maximum indication on the RMS voltmeter. Record level.	-10 (±5) dB	_____ dB. Note dB level and proceed with step 5.	
5	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator AM switch to OFF. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 4.	Proceed with step 6.	ECA A1, A2, or A3 defective.
6	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS leverwheel switch B to 3. b. Set leverwheel switch C to 5			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
6 (Cont)			c. Set leverwheel switches D, E, and F to 9. d. Set RF signal generator as follows: (1) Frequency: 35.999 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz e. Set RTS MGC toggle switches for a maximum indication on the RMS voltmeter. Record level.	-10 (±5) dB	_____ dB. Note dB level and proceed with step 7.	
7	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator AM switch to OFF. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 6.	Proceed with step 8.	ECA A1, A2, or A3 defective.

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
8	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS leverwheel switch C to 6. b. Set leverwheel switches D, E, and F to 0. c. Set RF signal generator as follows: (1) Frequency: 36.000 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz d. Set RTS MGC toggle switches for a maximum indication on the RMS voltmeter. Record level.	-10 (±5) dB	_____ dB. Note dB level and proceed with step 9.	
9	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator AM switch to OFF. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 8.	Proceed with step 10.	ECA A1, A2, or A3 defective.

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
10	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS leverwheel switch B to 4. b. Set leverwheel switch C to 8. c. Set RF signal generator as follows: (1) Frequency: 48.000 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz d. Set RTS MGC toggle switches for a maximum indication on the RMS voltmeter. Record level.	-10 (±5) dB	_____ dB. Note dB level and proceed with step 11.	
11	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator AM switch to OFF. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 10.	Proceed with step 12.	ECA A1, A2, or A3 defective.

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
12	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS leverwheel switch B to 5. b. Set leverwheel switch C to 9. c. Set leverwheel switches D, E, and F to 9. d. Set RF signal generator as follows: (1) Frequency: 59.999 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz e. Set RTS MGC toggle switches for a maximum indication on the RMS voltmeter. Record level.	-10 (±5) dB	_____dB. Note dB level and proceed with step 13.	
13	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator AM switch to OFF.			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
13 (Cont)			b. Observe RMS voltmeter indication.	>10dB below dB level noted in step 12.	Proceed with step 14.	ECA A1, A2, or A3 defective.
14	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS leverwheel switch B to 6. b. Set leverwheel switches C, D, E, and F to 0. c. Set RF signal generator as follows: (1) Frequency: 60.000 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz			
			d. Set RTS MGC toggle switches for a maximum indication on the RMS voltmeter. Record level.	-10 (±5) dB	___dB. Note the dB level and proceed with step 15.	
15	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator AM switch OFF.			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
15 (Cont)			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 14.	Proceed with step 16.	ECA A1, A2, or A3 defective.
16	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS leverwheel switch B to 8.			
			b. Set RF signal generator as follows: (1) Frequency: 80.000 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz			
			c. Set RTS MGC toggle switches for a maximum indication on the RMS voltmeter. Record level.	-10 (±5) dB	_____dB. Note dB level and proceed with step 17.	
17	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator AM switch to OFF.			

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
17 (Cont)			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 16.	Proceed with step 18.	ECA A1, A2, or A3 defective.
18	AUDIO BNC jack on BNC.	Same as step 1.	a. Set RTS leverwheel switches B, C, D, E, and F to 9. b. Set RF signal generator as follows: (1) Frequency: 99.999 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz			
			c. Set RTS MGC toggle switches for a maximum indication on the RMS voltmeter. Record level.	-10 (±5) dB	____dB. Note dB level and proceed with step 19.	

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
19	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator AM switch to OFF. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 18.	Proceed with step 20.	ECA A1, A2, or A3 defective.
20	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS leverwheel switch A to 1. b. Set leverwheel switches B, C, D, E, and F to 0. c. Set RF signal generator as follows: (1) Frequency: 100.000 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz d. Set RTS MGC toggle switches for a maximum indication on the RMS voltmeter. Record level.	-10 (±5) dB	_____dB. Note dB level and proceed with step 21.	

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
21	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator AM switch to OFF. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 20.	Proceed with step 22.	ECA A1, A2, or A3 defective.
22	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS leverwheel switch B to 2. b. Set leverwheel switch C to 5. c. Set RF signal generator as follows: (1) Frequency: 125.000 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz d. Set RTS MGC toggle switches for a maximum indication on the RMS voltmeter. Record level.	-10 (±5) dB	_____dB. Note dB level and proceed with step 23.	

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
23	AUDIO BNC jack on RTS.	Same as step 2.	a. Set RF signal generator AM switch to OFF. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 22.	Proceed with step 24.	ECA A1, A2, or A3 defective.
24	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS leverwheel switch B to 4. b. Set leverwheel switches C, D, E, and F to 9. c. Set RF signal generator as follows: (1) Frequency: 149.999 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz d. Set RTS MGC toggle switches for a maximum indication on the RMS voltmeter. Record level.	-10 (±5) dB	_____dB. Note dB level and proceed with step 25.	

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
25	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator AM switch to OFF. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 24.	Proceed with step 26.	ECA A1, A2, or A3 defective.
			FM Sensitivity Test			
26	AUDIO BNC jack on RTS.	Same as step 1.	a. On RTS, set controls as follows: (1) All leverwheel switches to 0. (2) All toggle switches down. (3) IF BW toggle switches to wide (left switch up = 1, right switch down = 0). (4) Leverwheel switch B to 2 (20.000 MHz).			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
26 (Cont)			b. Set RF signal generator as follows: (1) Frequency: 20.000 MHz (2) Output Level: -110 dBm (3) Modulation: FM: INT Peak Deviation: 20 kHz Modulation Frequency: 1 kHz			
			c. Record RMS voltmeter indication.	-10 (±5) dB	____dB. Note dB level and proceed with step 27.	
27	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator FM switch to OFF.			
			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 26.	Proceed with step 28.	ECA A1 or A3 defective.
28	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS leverwheel switch C to 8.			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
28 (Cont)			b. Set RF signal generator as follows: (1) Frequency: 28.000 MHz (2) Output Level: -110 dBm (3) Modulation: FM: INT Peak Deviation: 20 kHz Modulation Frequency: 1 kHz			
			c. Record RMS voltmeter indication.	-10 (±5) dB	___dB. Note dB level and proceed with step 29.	
29	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator FM switch to OFF. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 28.	Proceed with step 30.	ECA A1 or A3 defective.
30	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS leverwheel switch B to 3.			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
30 (Cont)			b. Set leverwheel switch C to 5. c. Set leverwheel switches D, E, and F to 9. d. Set RF signal generator as follows: (1) Frequency: 35.999 MHz (2) Output Level: -110 dBm (3) Modulation: AM: INT Peak Deviation: 20 kHz Modulation Frequency: 1 kHz e. Record RMS voltmeter indication.	-10 (±5) dB	___dB. Note dB level and proceed with step 31.	
31	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator FM switch to OFF.			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
31 (Cont)			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 30.	Proceed with step 32.	ECA A1 or A3 defective.
32	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS leverwheel switch C to 6. b. Set leverwheel switches D, E, and F to 0. c. Set RF signal generator as follows: (1) Frequency: 36.000 MHz (2) Output Level: -110 dBm (3) Modulation: FM: INT Peak Deviation: 20 kHz Modulation Frequency: 1 kHz d. Record RMS voltmeter indication.	-10 (±5) dB	____dB. Note dB level and proceed with step 33.	

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
33	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator FM switch to off. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 32.	Proceed with step 34.	ECA A1 or A3 defective
34	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS leverwheel switch B to 4. b. Set leverwheel switch C to 8. c. Set RF signal generator as follows: (1) Frequency: 48.000 MHz (2) Output Level: -110 dBm (3) Modulation: FM: INT Peak Deviation: 20 kHz Modulation Frequency: 1 kHz d. Record RMS voltmeter indication.	-10 (±5) dB	____dB. Note dB level and proceed with step 35.	

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
35	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator FM switch to OFF. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 34.	Proceed with step 36.	ECA A1 or A3 defective.
36	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS leverwheel switch B to 5. b. Set leverwheel switches C, D, E, and F to 9. c. Set RF signal generator as follows: (1) Frequency: 59.999 MHz (2) Output Level: -110 dBm (3) Modulation: FM: INT Peak Deviation: 20 kHz Modulation Frequency: 1 kHz			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
36 (Cont)			d. Record RMS voltmeter indication.	-10 (±5) dB	___dB. Note dB level and proceed with step 37.	
37	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator FM switch OFF. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 36.	Proceed with step 38.	ECA A1 or A3 defective.
38	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS leverwheel switch B to 6. b. Set leverwheel switches C, D, E, and F to 0. c. Set RF signal generator as follows: (1) Frequency: 60.000 MHz (2) Output Level: -110 dBm (3) Modulation: FM: INT Peak Deviation: 20 kHz Modulation Frequency: 1 kHz			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
38 (Cont)			d. Record RMS voltmeter indication.	-10 (±5) dB	___dB. Note dB level and proceed with step 39.	
39	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator FM switch to OFF. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 38.	Proceed with step 40.	ECA A1 or A3 defective.
40	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS leverwheel switch B to 8. b. Set RF signal generator as follows: (1) Frequency: 80.000 MHz (2) Output Level: -110 dBm (3) Modulation: FM: INT Peak Deviation: 20 kHz Modulation Frequency: 1 kHz			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
40 (Cont)			c. Record RMS voltmeter indication.	-10 (±5) dB	___dB. Note dB level and proceed with step 41.	
41	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator FM switch to OFF. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 40.	Proceed with step 42.	ECA A1 or A3 defective.
42	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS leverwheel switches B, C, D, E, and F to 9. b. Set RF signal generator as follows: (1) Frequency: 99.999 MHz (2) Output Level: -110 dBm (3) Modulation: FM: INT Peak Deviation: 20 kHz Modulation Frequency: 1 kHz			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
42 (Cont)			c. Record RMS voltmeter indication.	-10 (±5) dB	___dB. Note dB level and proceed with step 43.	
43	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator FM switch to OFF. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 42.	Proceed with step 44.	ECA A1 or A3 defective.
44	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS leverwheel switch A to 1. b. Set leverwheel switches B, C, D, E, and F to 0. c. Set RF signal generator as follows: (1) Frequency: 100.000 MHz (2) Output Level: -110 dBm (3) Modulation: FM: INT Peak Deviation: 20 kHz Modulation Frequency: 1 kHz			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
44 (Cont)			d. Record RMS voltmeter indication.	-10 (±5) dB	___dB. Note dB level and proceed with step 45.	
45	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator FM switch to OFF. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 44.	Proceed with step 46.	ECA A1 or A3 defective.
46	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS leverwheel switch B to 2. b. Set leverwheel switch C to 5. c. Set RF signal generator as follows: (1) Frequency: 125.000 MHz (2) Output Level: -110 dBm (3) Modulation: FM: INT Peak Deviation: 20 kHz Modulation Frequency: 1 kHz			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
46 (Cont)			d. Record RMS voltmeter indication.	-10 (±5) dB	____. Note dB level and proceed with step 47.	
47	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator FM switch to OFF. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 46.	Proceed with step 48.	ECA A1 or A3 defective.
48	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS leverwheel switch B to 4. b. Set leverwheel switches C, D, E, and F to 9. c. Set RF signal generator as follows: (1) Frequency: 149.999 MHz (2) Output Level: -110 dBm (3) Modulation: FM: INT Peak Deviation: 20 kHz Modulation Frequency: 1 kHz			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
48 (Cont)			d. Record RMS voltmeter indication.	-10 (±5) dB	___dB. Note dB level and proceed with step 49.	
49	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator FM switch to OFF.			
			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 48.	Proceed with step 50.	ECA A1 or A3 defective.
			IF Sensitivity Test			
50	AUDIO BNC jack on RTS.	Same as step 1.	a. On RTS, set controls as follows:			
			(1) All RTS leverwheel switches to 0.	>-10 dB level.		ECA A3 defective.
			(2) All toggle switches down.			
			(3) AC POWER switch to OFF.			
			b. Set RF signal generator RF OUT switch to OFF.			
			c. Remove bottom cover from the receiver case.			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
50 (Cont)			d. Disconnect push-on coaxial cables from connector J1 on IF amplifier ECA A3. e. Connect RF signal generator to connector J1 on IF amplifier ECA A3. f. On RTS, set controls as follows: (1) AC POWER switch to on. (2) Leverwheel switch B to 2 (Band 1). (3) IF BW toggle switches to Narrow (left switch down = 0, right switch down = 0). (4) AM/FM toggle switch up (AM mode). g. Set RF signal generator RF OUT switch to on.			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
50 (Cont)			h. Set RF signal generator as follows: (1) Frequency: 10.700 MHz (2) Output Level: -80 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz			
			i. Record RMS voltmeter indication.	____dB. Note dB level and proceed with step 50j.		
			j. Set RTS MGC/AGC toggle switch up (MGC on).			
			k. Set RTS MGC bit switches for same RMS voltmeter indication as in step i.			
			l. Set RF signal generator AM switch to OFF.			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
50 (Cont)			m. Observe RMS voltmeter indication.	RMS voltmeter indicates same as in step 50i.	Proceed with step 50n.	ECA A3 defective.
			n. Set RF signal generator AM switch to INT.			
			o. Set RF signal generator frequency to 30.000 MHz.			
			p. Set RTS leverwheel switch A to 1.			
			q. Set RTS MGC/AGC toggle switch down (AGC on).			
			r. Repeat steps i thru m.	RMS voltmeter indicates same as in step 50i.	Proceed with step 51.	ECA A3 defective.
			IF Bandwidth Select Test			
51	A3-FL3, FL4, FL5	Same as step 1.	a. Verify RTS IF BW toggle switches are down (Narrow).			
			b. Connect oscilloscope to test points listed and observe voltage levels. (Refer to figure 5-3 for test point locations.)	TTL low at A3-FL3. TTL high at A3-FL4 and A3-FL5.	Proceed with step 52.	ECA A2 defective.

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
52	A3-FL3, FL4, FL5	Same as step 1.	a. Set RTS IF BW toggle switches to Medium (left switch down = 0 right switch up = 1).			
			b. Connect oscilloscope to test points listed and observe voltage levels.	TTL low at A3-FL4. TTL high at A3-FL3 and A3-FL5.	Proceed with step 53.	ECA A2 defective.
53	A3-FL3, FL4, FL5,	Same as step 1.	a. Set RTS IF BW toggle switches to Wide (left switch up = 1, right switch down = 0).			
			b. Connect oscilloscope to test points listed and observe voltage levels.	TTL low at A3-FL5 TTL high at A3-FL3 and A3-FL4.	Proceed with step 54.	ECA A2 defective.
			IF Bandwidth Test			
54	AUDIO BNC jack on RTS.	Same as step 1.	a. On RTS, set controls as follows: (1) MGC toggle switches 1, 2, 4, and 8 down (minimum gain). (2) MGC/AGC toggle switch up (MGC on).			

Table 5-6. Radio Receiver R-5078/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
54 (Cont)			(3) IF BW toggle switches down (narrow). (4) AM/FM toggle switch up (AM mode). (5) Leverwheel switch B to 8. b. Remove RF signal generator output from connector J1 in IF amplifier ECA A3 and connect to receiver front panel connector J4. c. Reconnect original cable to J1 on IF amplifier ECA A3. d. Set RF signal generator as follows: (1) Frequency: 80.000 MHz (2) Output Level: -80 dBm			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
54 (Cont)			(3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz e. Set RTS MGC toggle switches and RF signal generator frequency to obtain a maximum indication on the RMS voltmeter (up for more IF gain). f. Adjust RF signal generator output level to obtain an indication of -10 dB on the RMS voltmeter (setting arbitrary reference level). g. Increase RF signal generator frequency until RMS voltmeter indication decreases 6 dB to a reading of -16 dB. Record displayed frequency.	80.00X MHz		

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
54 (Cont)			h. Decrease RF signal generator frequency until RMS voltmeter again displays a reading of -16 dB. Record displayed frequency.	79.99X MHz		
			i. Verify that the difference between frequencies noted in steps g and h are within required limits.	8 (±5) kHz (narrow BW)	Proceed with step 55.	ECA A3 defective.
55	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS IF BW toggle switches to Medium (left switch down = 0, right switch up = 1). b. Set RF signal generator as follows: (1) Frequency: 80.000 MHz (2) Output Level: -80 dBm c. Set RTS MGC toggle switches and RF signal generator frequency to obtain maximum indication on the RMS voltmeter.			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
55 (Cont)			d. Adjust RF signal generator output level to obtain an indication of -10 dB on the RMS voltmeter.			
			e. Increase RF signal generator frequency until RMS voltmeter indication decreases 6 dB to a reading of -16 dB. Record displayed frequency.	80.0XX MHz		
			f. Decrease RF signal generator frequency until RMS voltmeter indication again displays a reading of -16 dB. Record displayed frequency.	79.9XX MHz		
			g. Verify that the difference between frequencies noted in steps e and f are within required limits.	30 (±5) kHz (medium BW)	Proceed with step 56.	ECA A3 defective.
56	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS IF BW toggle switches to Wide (left switch up = 1, right switch down = 0).			

Table 5-6. Radio Receiver R-507/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
56 (Cont)			b. Set RF signal generator as follows: (1) Frequency: 80.000 MHz (2) Output Level: -80 dBm c. Set RTS MGC toggle switches and RF signal generator frequency to obtain maximum indication on RMS voltmeter. d. Adjust RF signal generator output level to obtain an indication of -10 dB on the RMS voltmeter. e. Increase RF signal generator frequency until RMS voltmeter indication decreases 6 dB to a reading of -16 dB. Record displayed frequency.	80.0XX MHz		

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
56 (Cont)			f. Decrease RF signal generator frequency until RMS voltmeter indication again displays a reading of -16 dB. Record displayed frequency.	79.9XX MHz		
			g. Verify that the difference between frequencies noted in steps e and f are within required limits.	50 (±10) kHz (wide BW)	Proceed with step 57.	ECA A3 defective.
			Detector Select Test			
57	A3-FL9, FL13, FL14	Same as step 1.	a. Set the RTS AC POWER switch to OFF.			
			b. Set RF signal generator RF out switch to OFF.			
			c. Remove top and bottom covers from the receiver.			
			d. On RTS set controls as follows:			
			(1) AC POWER switch to on.			
			(2) BFO toggle switch down (off).			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
57 (Cont)			(3) AM/FM toggle switch up (AM mode).			
			e. Set RF signal generator RF OUT switch to ON.			
			f. Connect oscilloscope to test points listed and observe voltage levels.	TTL low at A3-FL9. TTL high at A3-FL13 and A3-FL14.	Proceed with step 58.	ECA A2 defective.
58	A3-FL9, FL13, FL14	Same as step 1.	a. Set the RTS AM/FM toggle switch down (FM mode).			
			b. Ensure that the BFO toggle switch is down (off).			
			c. Connect oscilloscope to test points listed and observe voltage levels.	TTL low at A3-FL14. TTL high at A3-FL9 and A3-FL13.		ECA A2 defective.
			d. Set RTS BFO toggle switch up (on).			
			e. Connect oscilloscope to test points listed and observe voltage levels.	TTL low at A3-FL13. TTL high at A3-FL9 and A3-FL14.	Proceed with step 59.	ECA A2 defective.

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
			ALC Select			
59	A3A2-E29 (R108)	Same as step 1.	a. On RTS, set controls as follows: (1) ALC toggle switch up (ALC on). (2) MGC/AGC toggle switch down (AGC on). (3) IF BW toggle switches to wide (left switch up = 1, right switch down = 0). (4) AM/FM toggle switch up (AM mode). (5) Leverwheel switch B to 2. (6) Leverwheel switches A, C, D, E, and F to 0. b. Set RF signal generator as follows: (1) Frequency: 20.000 MHz (2) Output Level: -100 dBm			

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
59 (Cont)			(3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz			
			c. Connect oscilloscope to test point and observe display (refer to figure 5-3 for test point location).	1.0 (±1.0) V dc	Proceed with step 60.	ECA A3 defective.
60	A3A2-E29 (R108)	Same as step 1.	a. Set RF signal generator AM switch to off.			
			b. Observe oscilloscope.	0.3 (±0.3) V dc	Proceed with step 61.	ECA A3 defective.
61	A3A2-E29 (R108)	Same as step 1.	a. Set the RTS ALC toggle switch down (ALC off).			
			b. Observe oscilloscope.	0.0 (±0.1) V dc	Proceed with step 62.	ECA A3 defective.
			<u>Audio Output (ALC) Test</u>			
62	AUDIO BNC jack on RTS.	Same as step 1.	a. Set the RTS IF BW toggle switches down (narrow).			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
62 (Cont)			b. Set leverwheel switch B to 8. c. Set RF signal generator as follows: (1) Frequency: 80.000 MHz (2) Output Level: -80 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz			
			d. Observe RMS voltmeter indication.	>-10 dB level.	Proceed with step 63.	ECA A3 defective.
63	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RTS ALC toggle switch up (on).			
			b. Observe RMS voltmeter indication.	>-10 dB level	Note the voltage level and proceed with step 64.	ECA A3 defective.

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
63 (Cont)			NOTE Allow 15 seconds for ALC circuit to stabilize before checking RMS voltage indication.			
64	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator modulation to 90%. b. Observe RMS voltmeter indication.	Same level as noted in step 63, ±0.15 V rms.	Proceed with step 65.	ECA A3 defective.
65	AUDIO BNC jack on RTS.	Same as step 1.	a. Set RF signal generator modulation to 20%. b. Observe RMS voltmeter indication.	Same level as noted in step 63, ±0.15 V rms.	Proceed with step 66.	ECA A3 defective.

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
			MGC/AGC Control Test			
66	A3-FL10 (E16)	Same as step 1.	a. On RTS, set controls as follows: (1) MGC/AGC toggle switch down (AGC on). (2) IF BW toggle switches to Medium (left switch down = 0, right switch up = 1) (3) AM/FM toggle switch up (AM mode). (4) Leverwheel switch B to 2. b. Set RF signal generator as follows: (1) Frequency: 20.000 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
66 (Cont)			c. Set the RTS ALC toggle switch down (ALC off).			
			d. Connect oscilloscope to test point and observe indication (refer to figure 5-3 for test point location).	8.0 (±3.0) V dc	Proceed with step 67.	ECA A3 defective.
67	A3-FL10	Same as step 1.	a. Set RF signal generator output level to 0 dBm.			
			b. Observe oscilloscope indication.	1.0 (±1.0) V dc	Proceed with step 68.	ECA A3 defective.
68	A3-FL10	Same as step 1.	a. Set RF signal generator output level to -80 dBm.			
			b. Set the RTS MGC/AGC toggle switch up (MGC on).			
			c. Set the RTS MGC toggle switch 1 up.			
			d. Observe oscilloscope indication.	1.0 (±1.0) V dc	Proceed with step 69.	ECA A3 defective.

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
69	A3-FL10	Same as step 1.	a. Set the RTS MGC toggle switches 2, 4, 8, and 16 up.			
			b. Observe oscilloscope indication.	8.0 (±2.0) V dc	Proceed with step 70.	ECA A3 defective.
			SSB/CW Test			
70	AUDIO BNC jack	Same as step 1.	a. Ensure that RF signal generator modulation is off.			
			b. Set RTS AC POWER switch to OFF.			
			c. Remove top cover of receiver.			
			d. Disconnect A4W1J3 from A2W1P3.			
			e. Connect ECA A4 test cable J1 to A2W1P3.			
			f. Connect ECA A4 test cable P1 to A4W1J3.			
			g. Set RTS AC POWER switch to ON.			

Table 5-6. Radio Receiver R-5076/S Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
70 (Cont)			h. Set up power supply for +5 V dc output and connect to P1-L and P1-M on ECA A4 test cable. i. Set RTS controls as follows: (1) Leverwheel switch B to 8. (2) Leverwheel switches A, C, D, E, and F to 0. (3) IF BW switches for a 0, 1 code (30 kHz bandwidth). (4) ALC toggle switch down. (5) MGC toggle switches 1, 2, 4, 8, and 16 down. (6) MGC/AGC toggle switch down (AGC on).			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
70 (Cont)			(7) AM/FM toggle switch down (FM). (8) CW toggle switch up. (9) SUPPLY-SIGNAL MONITOR switch to 0-36V. (10) Adjust RTS R1 for +1 V reading on SUPPLY-SIGNAL MONITOR. j. Connect RTS 0-36V TV output to J1-N on ECA A4 test cable. k. Set RF signal generator as follows: (1) Frequency: 80.000 MHz. (2) Output Level: -100 dBm. (3) Modulation: OFF l. Observe RMS voltmeter indication and record level.	____ dBm. Note dB level and proceed with step 70m.		

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
70 (Cont)			m. Set RTS MGC/AGC toggle switch up (MGC on).			
			n. Set MGC toggle switches 1, 2, 4, 8, and 16 for same reading as in step 701.	Same as in step 701.	Proceed with step 70o.	ECA A3 or A4 defective.
			o. Tune RF signal generator for minimum reading on RMS voltmeter.			
			p. Set RTS leverwheel switch B to 7.			
			q. Set RTS leverwheel switches C, D, E, and F to 9.			
			r. Disconnect and ground P1-L on ECA A4 test cable.			
			s. Adjust RTS R1 to obtain 1-kHz sinewave on oscilloscope.			
			t. Observe RMS voltmeter indication and record level.	_____ dBm. Note dB level and proceed with step 70u.		

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
70 (Cont)			u. Set RTS leverwheel switch F to 5.			
			v. Observe RMS voltmeter indication.	-5 dB less than reading obtained in step 70t.	Proceed with step 70w.	ECA A3 or A4 defective.
			w. Tune RF signal generator to 80.000 MHz.			
			x. On RTS, set controls as follows: (1) MGC/AGC toggle switch down (AGC on). (2) Leverwheel switch B to 8. (3) Leverwheel switches C, D, E, and F to 0.			
			y. Observe oscilloscope while changing the tuning frequency between 79.995 MHz and 80.005 MHz using RTS leverwheel switches. Verify correct BFO operation.	An audio sinewave, varying in amplitude as the tuned frequency is changed.	Proceed with step 70z.	ECA A3 or A4 defective.

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
70 (Cont)			z. On RTS, set controls as follows: (1) Leverwheel switch B to 8. (2) Leverwheel switches C, D, E, and F to 0. aa. Adjust RTS R1 for +1 V reading on SUPPLY-SIGNAL MONITOR. bb. Disconnect ground from P1-L on ECA A4 test cable and connect to power supply output. cc. Observe RMS voltmeter indication and record level.	_____ dBm. Note dB level and proceed with step 70dd. dd. Set RTS MGC/AGC toggle switch up (MGC on).		
			ee. Set MGC toggle switches 1, 2, 4, 8, and 16 for same reading as in step 70cc.	Same as in step 70ee.	Proceed with step 70ff.	ECA A3 or A4 defective.

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
70 (Cont)			ff. Tune RF signal generator for minimum reading on RMS voltmeter.			
			gg. Set RTS leverwheel switches C, D, E, and F to 1.			
			hh. Disconnect and ground P1-M on ECA A4 test cable.			
			ii. Adjust RTS R1 to obtain 1-kHz sinewave on oscilloscope.			
			jj. Observe RMS voltmeter indication and record level.	_____ dBm. Note dB level and proceed with step 70kk.		
			kk. Set RTS leverwheel switch F to 5.			
			ll. Observe RMS voltmeter indication.	-5 dB less than reading obtained in step 70jj.	Proceed with step 70mm.	ECA A3 or A4 defective.
			mm. Tune RF signal generator to 80.000 MHz.			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
70 (Cont)			nn. On RTS, set controls as follows: (1) MGC/AGC toggle switch down (AGC on). (2) Leverwheel switch F to 0.			
			oo. Observe oscilloscope while changing the tuning frequency between 79.995 MHz and 80.005 MHz using RTS leverwheel switches. Verify correct BFO operation.	An audio sine-wave, varying in amplitude as the tuned frequency is changed.	Proceed with step 71.	ECA A3 or A4 defective.
			<u>RF Test Source Select Test</u>			
71	A1-FL9	Same as step 1.	a. Connect oscilloscope to test point (refer to figure 5-4 for test point location).			
			b. Observe oscilloscope.	-1.5 (±0.3) V dc	Proceed with step 72.	ECA A2 defective.

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
72	A1-FL9	Same as step 1.	a. Set the RTS TST TNS toggle switch up (tone on).			
			b. Observe oscilloscope.	+15 (±1.0) V dc	Proceed with step 73.	ECA A2 defective.
			c. Set the RTS TST TNS toggle switch down (tone off).			
			NOTE Steps 73, 74, and 75 describe a test procedure using the RTS SUPPLY-SIGNAL MONITOR digital panel meter to monitor the AGC voltage, which represents signal strength, from the 1st and 2nd IF amplifiers. An RF signal generator is used to reference the voltage scale (AGC volts) to an RF signal strength scale (dBm). A stronger RF signal produces a more positive AGC voltage.			

Table 5-6. Radio Receiver R-5076/R Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
			RF Test Source Test			
73	NA	Same as step 1.	a. Set RF signal generator RF OUT switch to OFF. b. On RTS, set controls as follows: (1) Meter select switch to AGC. (2) IF BW toggle switches to Wide (left switch up = 1, right switch down = 0) (3) AM/FM toggle switch down (FM mode). (4) Leverwheel switch B to 2. (5) Leverwheel switch C to 1. (6) Leverwheel switches D, E, and F to 0. (7) ALC toggle switch down (ALC off). (8) TST TNS toggle switch up (tone on).			

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
73 (cont)			c. Record SUPPLY-SIGNAL MONITOR indication and set TST TNS toggle switch down (tone off).	_____ V dc level	Note the voltage and proceed with step 74.	
74	NA	Same as step 1.	a. Set RF signal generator as follows: (1) RF OUT: ON (2) Frequency: 21.000 MHz (3) Output Level: -90 dBm (4) Modulation: OFF			
			b. Observe RTS SUPPLY-SIGNAL MONITOR indication and adjust the frequency of the signal generator to obtain a peak reading.			
			c. Adjust RF signal generator output level to obtain the same voltage level noted in step 73.			
			d. Observe RF signal generator output level.	-70 (±10) dBm.	Proceed with step 75.	ECA A1 defective.

Table 5-6. Radio Receiver R-5076/G Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
75	NA	Same as step 1.	a. Repeat steps 73 and 74 for each of the following frequencies: 39.0 MHz 99.0 MHz 41.0 MHz 101.0 MHz 59.0 MHz 119.0 MHz 61.0 MHz 121.0 MHz 79.0 MHz 139.0 MHz 81.0 MHz 141.0 MHz b. Ensure that the RTS leverwheel switches and signal generator frequencies are the same. c. For each frequency the results shall be the same as obtained in steps 73 and 74. NOTE Steps 76 and 77 contain test procedures for testing the test source using a spectrum analyzer instead of the RTS DPM. Either method is sufficient.	-70 (±10) dBm	Proceed with step 76.	ECA A1 defective.

Table 5-6. Radio Receiver R-5076/U Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
76	A1J2	Same as step 1.	a. Connect RF input of spectrum analyzer to test point and observe the display.	Frequency spectrum appears as figure 4-6.	Proceed with step 76b.	ECA A1 defective.
			b. Repeat steps 73 thru 75 for each of the frequencies listed in step 75.			
			c. Observe spectrum analyzer display.	Frequency spectrum appears as figure 4-6.	Proceed with step 77.	ECA A1 defective.

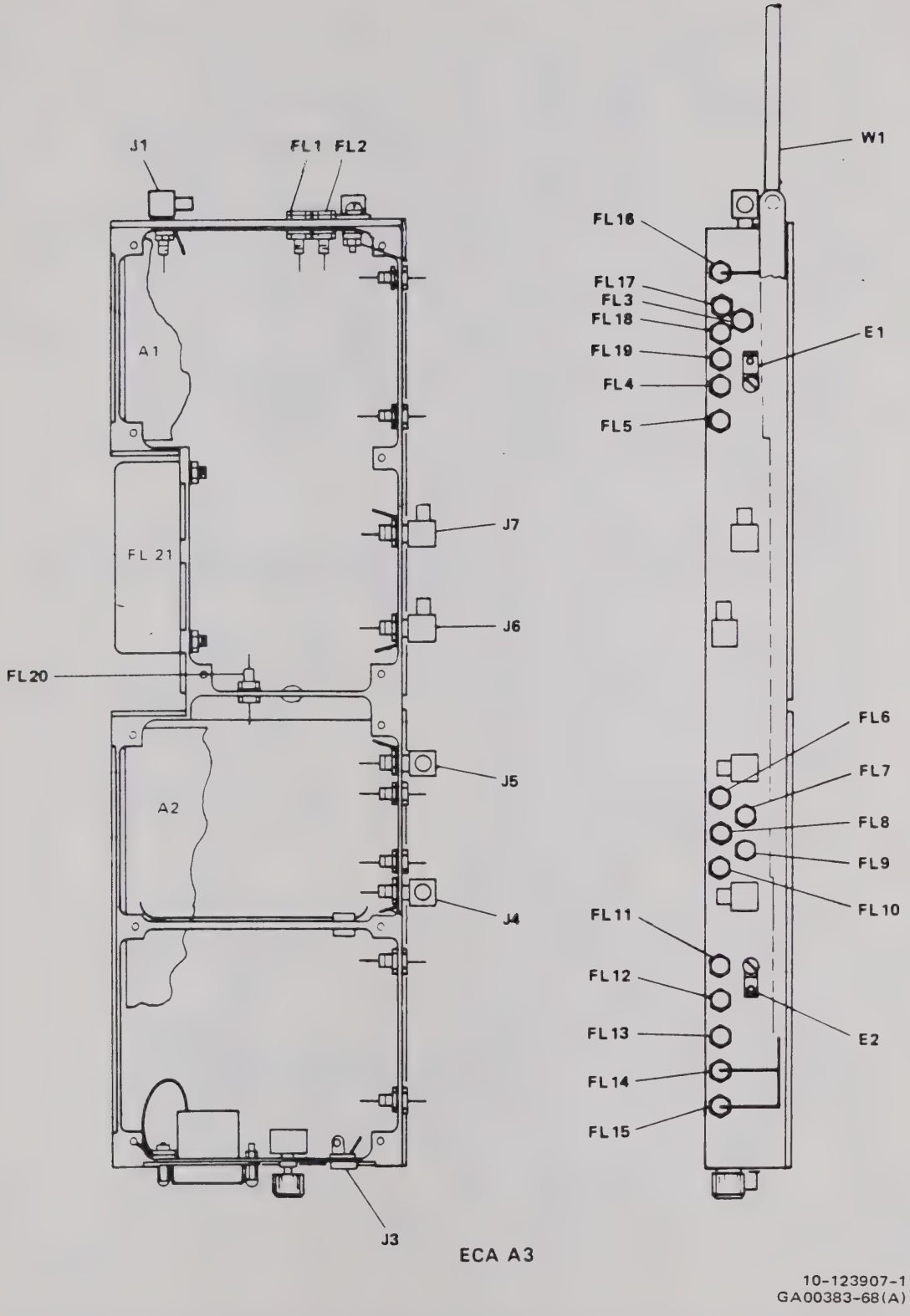


Figure 5-3. First and Second IF Amplifier/Detector ECA A3 Test Point Locations (Sheet 1 of 2)

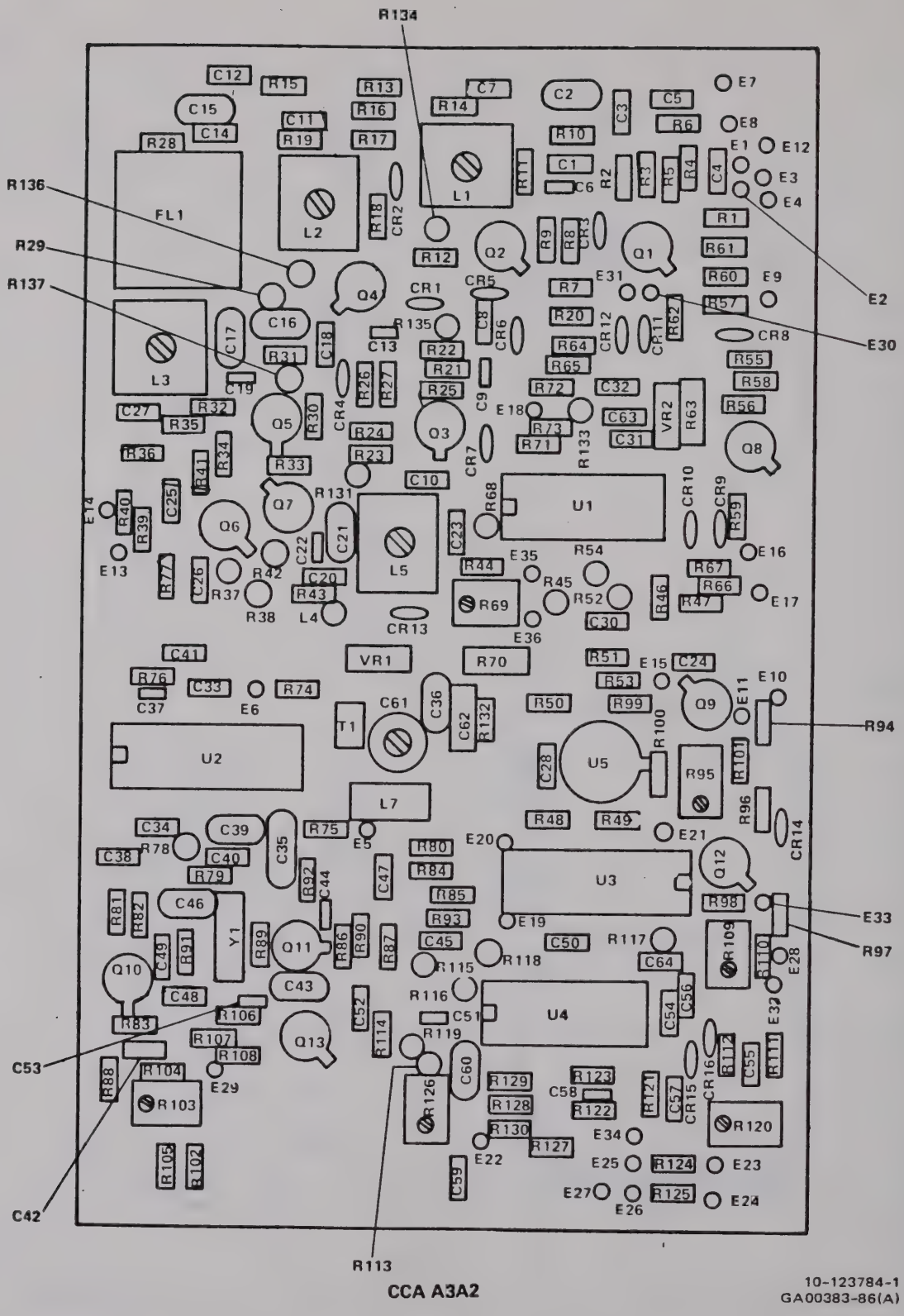


Figure 5-3. First and Second IF Amplifier/Detector ECA A3 Test Point Locations (Sheet 2 of 2)

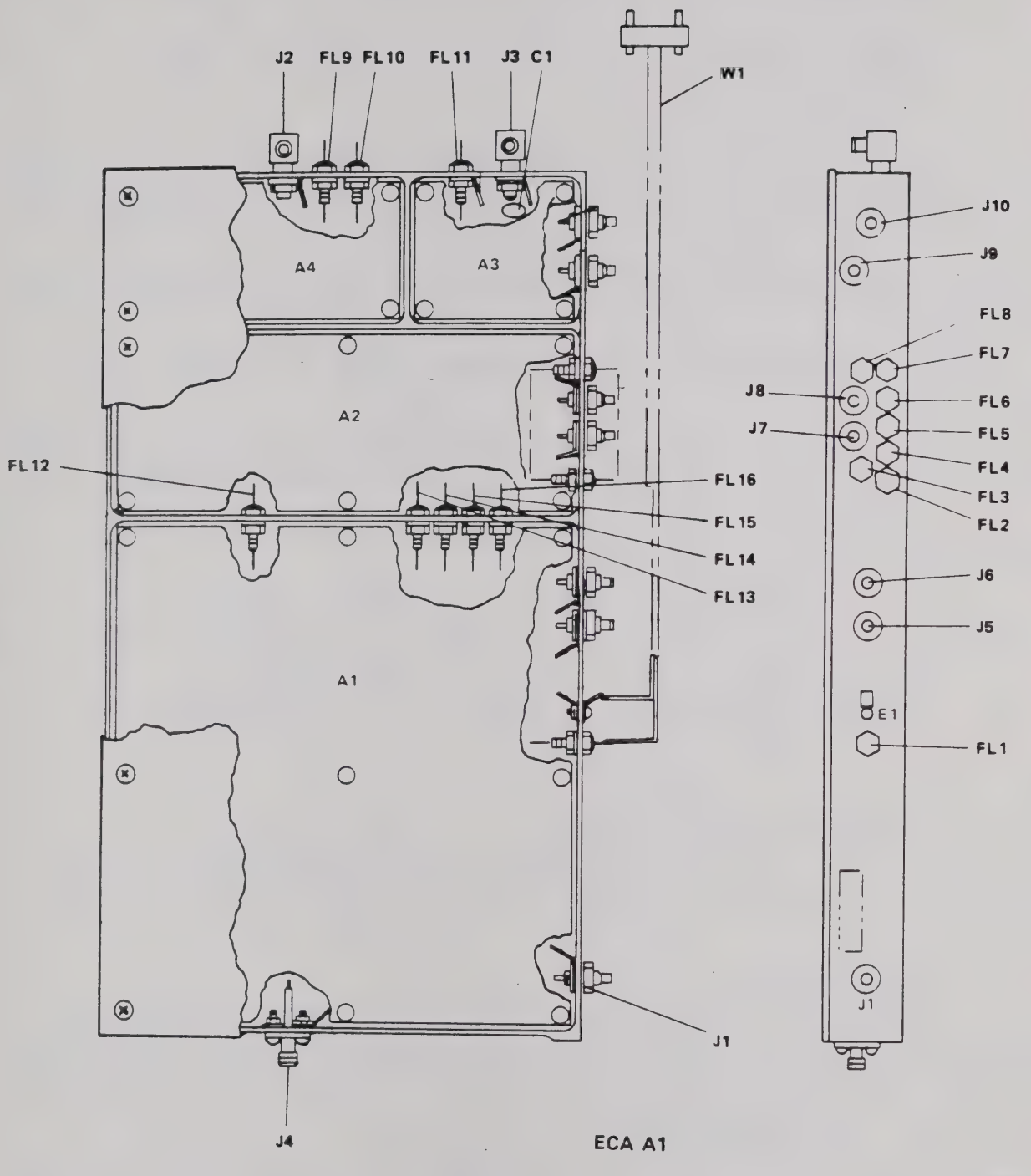


Figure 5-4. Front End ECA A1 Test Point Locations

CAUTION

While performing the test procedures, be careful to prevent shorts or equipment damage may result.

While testing the receiver, do not exceed a 0-dBm input to the front end.

MOS devices contained in receiver circuitry can be damaged by the accumulation of excess static charge. The following procedures should be observed while handling, testing, or using these devices:

1. To avoid the buildup of static charge, the leads of the devices should remain shorted together with a metal ring except when being tested or used.

2. Avoid unnecessary handling. Pick up devices by the case instead of the leads.

3. Do not insert or remove devices from circuits with the power on because transient voltages may cause permanent damage.

The type and location of MOS devices contained in the R-5076/U are listed below:

Location	Type
A1A2 Q1 - Q4	SD203
A3A1 Q1, Q11 & Q12	3N200
A3A2 Q3, Q5, Q10, Q11 & Q13	3N200/3N204
A3A1 Q3 & Q9	U322-2

5.6 DISASSEMBLY AND ASSEMBLY.

The following subparagraphs provide instructions for disassembly and reassembly of covers, ECAs, and CCAs of the R-5076/U.

5.6.1 DISASSEMBLY.

Disassembly of the R-5076/U consists of removing top and bottom covers and three ECAs using a Phillips screwdriver and a small standard screwdriver (refer to figure 5-5 for subassembly locations).

a. Top Cover Removal.

(1) Remove 31 flat-head 2-56 Phillips screws securing the cover to the left side plate and to machined surfaces on Front End ECA A1 and the rear block.

(2) Lift off cover.

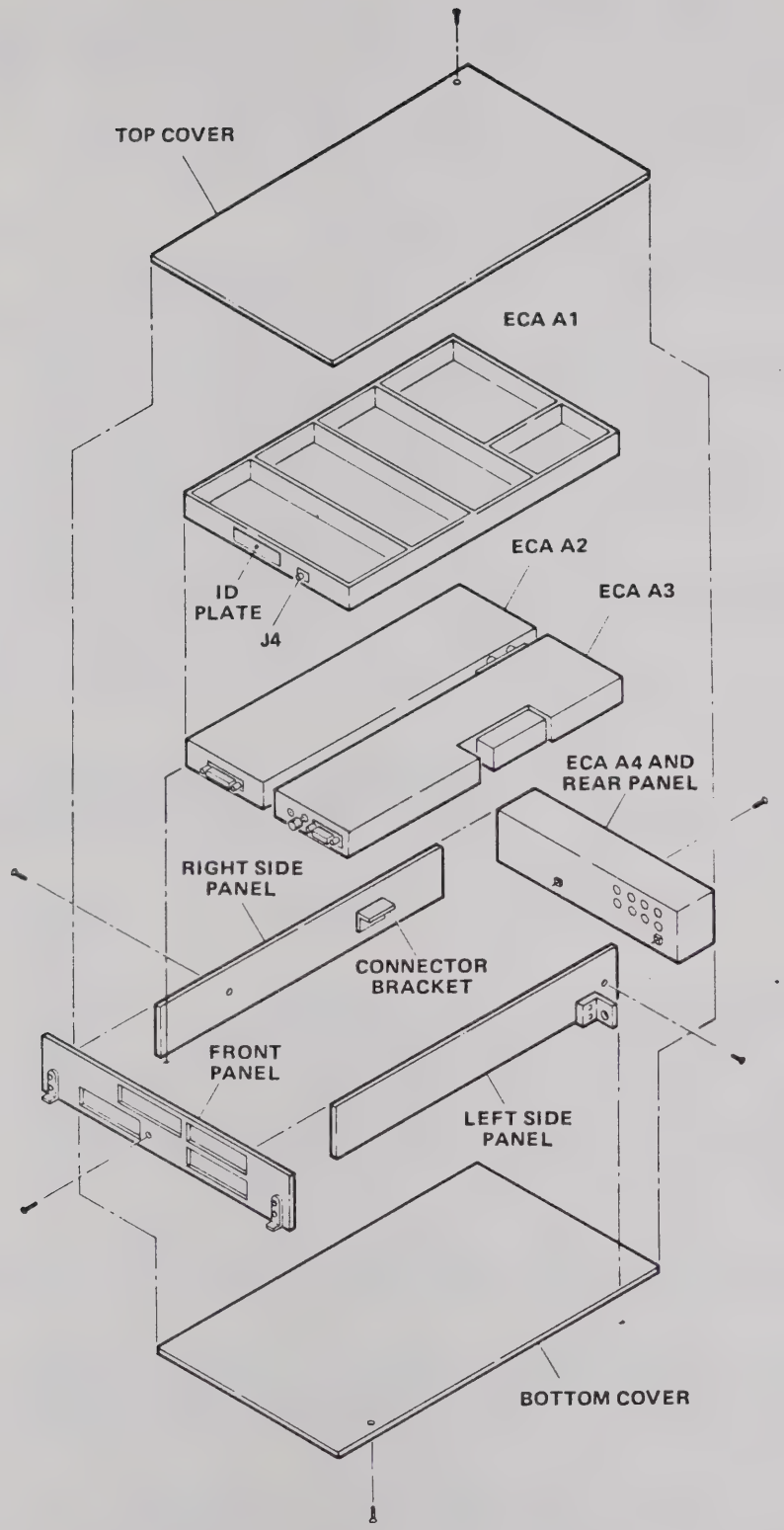


Figure 5-5. Radio Receiver R-5076/U Subassembly Locations

b. Bottom Cover Removal.

(1) Remove 25 flat-head 2-56 Phillips screws securing the cover to machined surfaces of Synthesizer ECA A2, First and Second IF Amplifier/Detector ECA A3, and the rear block.

(2) Lift off cover.

c. Front End ECA A1 Removal.

(1) Remove top cover as described in a., above.

(2) Remove five flat-head 2-56 Phillips screws securing ECA A1 to the right side panel.

(3) Remove three pan-head 2-56 Phillips screws, split lockwashers, and flat washers securing ECA A1 to the front panel.

(4) Gently raise ECA A1 out of the chassis to gain access to the coaxial jacks around the sides of ECA A1. If necessary, cut some wire ties to free ECA A1 wire bundle from the unit coaxial cables.

(5) Remove push-on coaxial cables from ECA A1 J1, J2, J3, J5, J6, J7, J9, and J10.

(6) Loosen the two captive slotted screws securing cable W1 multipin connector J2 to the connector bracket at the left rear corner of the chassis. Remove the connector.

(7) Remove ECA A1 from the unit, taking care not to damage front panel connector J4.

d. Synthesizer ECA A2 Removal.

(1) Remove top and bottom covers as described in a. and b., above.

(2) Remove four flat-head 2-56 Phillips screws securing ECA A2 to the left side panel.

(3) Remove two pan-head 2-56 Phillips screws, split lockwashers, and flat washers securing ECA A2 to the front panel.

(4) Gently lift ECA A2 out of the chassis to gain access to the coaxial cable connectors.

(5) Remove push-on coaxial cable connectors from ECA A2 J2 and J3.

(6) Remove two flat-head 2-56 Phillips screws securing the multipin connector bracket to the left side panel at the rear of the chassis. Disconnect all multipin connectors from the bracket by loosening captive slotted screws.

(7) Gently lift ECA A2 free of the chassis. If necessary, remove the four flat-head 2-56 Phillips screws (two on each side) securing the rear block in place to obtain sufficient clearance for multipin connector bracket removal.

e. First and Second IF Amplifier/Detector ECA A3 Removal.

(1) Remove top and bottom covers as described in a. and b., above.

(2) Remove the five flat-head 2-56 Phillips screws securing ECA A3 to the right side panel.

(3) Remove two pan-head 2-56 Phillips screws, split lockwashers, and flat washers securing ECA A3 to the front panel.

(4) Gently lift ECA A3 out of the chassis to gain access to ECA A3 coaxial cable connectors. Remove ECA A3 push-on coaxial connectors J1, J6, and J7.

(5) Turn the unit upside down and loosen two captive slotted screws securing A3 multipin connector J1 to connector bracket at the left rear corner of chassis. Remove the connector from the socket.

(6) Lift ECA A3 from the chassis. If necessary, remove the four flat-head 2-56 Phillips screws (two on each side) securing the rear block in place to obtain sufficient clearance for A3 cable connector removal.

5.6.2 ASSEMBLY

The following instructions are arranged in the sequence required to reassemble an R-5076/U completely disassembled to the level described in paragraph 5.6.1. If the R-5076/U is only partially disassembled, perform only the applicable steps. See figure 5-5 for parts identification and relative locations. All assembly may be accomplished using a 4-inch Phillips screwdriver and a small standard screwdriver.

a. First and Second IF Amplifier/Detector ECA A3 Installation.

(1) Place ECA A3 in the approximate installation position. If ECA A2 is installed, connect A3 W1 multipin connector J1 to connector bracket at the left rear of the chassis. Secure it in place with two captive slotted screws.

(2) Connect coaxial cable W5 to A3 J1, W7 to A3 J7, and W8 to A3 J6. (Cable W8 is used with receivers having SSB Options.)

(3) Secure ECA A3 to the right side panel with five 3/16-inch flat-head 2-56 Phillips screws.

(4) Secure ECA A3 to the front panel with two 1/4-inch pan-head 2-56 Phillips screws, split lockwashers, and flat washers.

(5) If only ECA A3 was removed, install the bottom and top covers as described in d. and e., below.

b. Synthesizer ECA A2 Installation.

(1) Place ECA A2 in approximate installation position.

(2) Install the multipin connector bracket (on the end of A2 W1 cable) at the left rear corner of the chassis with receptacles facing up. Secure in place on left side panel with two 3/16-inch flat-head 2-56 Phillips screws.

(3) Connect coaxial cable W3 to A2 J2 and W4 to A2 J3.

(4) Secure ECA A2 to left side panel with four 3/16-inch flat-head 2-56 Phillips screws.

(5) Secure ECA A2 to front panel with two 1/4-inch pan-head 2-56 Phillips screws, split lockwashers, and flat washers.

(6) Install multipin connectors from ECA A3 (and ECA A1, if installed) in the multipin connector bracket. (Each connector is keyed to fit only in the proper socket.) Secure each connector in place with two captive slotted screws.

(7) If only ECA A2 was removed, install bottom and top covers as described in d. and e., below.

c. Front End ECA A1 Installation.

(1) Place ECA A1 in approximate installation position. Connect A1 W1 multipin connector J2 in multipin connector bracket at left rear of chassis. Use caution when routing cable to ensure that ECA A1 will fit into the chassis.

(2) Connect coaxial cable W1 to A1 J2 and J1, W5 to A1 J3, W2 to A1 J10, W6 to A1 J5 and J9, W3 to A1 J7, and W4 to A1 J6 (A1 J8 is left empty).

NOTE

It may be necessary to remove the four screws securing the rear block to gain access to A1 J3. After connecting W5, reassemble as necessary.

(3) Position ECA A1 in place and secure to the right side panel with five 3/16-inch flat-head 2-56 Phillips screws.

(4) Secure ECA A1 to the front panel with three pan-head 2-56 Phillips screws, split lockwashers, and flat washers.

(5) Install bottom and top covers as described in d. and e., below.

d. Bottom Cover Installation.

NOTE

If maintenance has been performed on any subassembly, refer to paragraph 5.7.2 for final adjustment before replacing top and bottom covers.

(1) Place cover in position.

(2) Secure cover to chassis with 25 3/16-inch flat-head 2-56 Phillips screws.

e. Top Cover Installation.

(1) Place cover in position.

(2) Secure cover to chassis with five 1/4-inch Phillips screws along the left edge and 26 3/16-inch Phillips screws around machining edges.

NOTE

If Front End ECA A1 was replaced and it is difficult to line up the holes, loosen the side-plate screws securing ECA A1 to attain proper screw-hole alignment. After all screws have been started, tighten side-plate screws and cover screws.

5.7 ALIGNMENT AND ADJUSTMENT.

The following subparagraphs describe adjustment procedures for individual R-5076/U ECAs and CCAs. Perform these adjustments following repair of individual items before they are reassembled into a complete unit or following detection of failures during performance testing or troubleshooting. Adjustments performed after reassembly are described in paragraph 5.7.2.

NOTE

The adjustment procedures contained in paragraph 5.7 require the RTS. If the RTS is not available, perform the adjustment procedures contained in paragraph C.3.

5.7.1 SUBASSEMBLY ADJUSTMENT.

Adjustments described in the following subparagraphs enable the technician to set the gain and tuning of individual circuits on R-5076/U ECAs and CCAs after the unit has been disassembled (see paragraph 5.6.1). These settings are initial adjustments and may require slight changes as individual ECAs and CCAs are mated together during final assembly. If all ECAs and CCAs in a receiver undergo overhaul, perform the adjustments in the sequence presented here.

CAUTION

Before attempting adjustment of coil-tuning center slugs, use a sharp knife to cut the glyptol and conformal coating around the slugs. Failure to heed this caution may result in damage to the coil when the slug is turned.

NOTE

RF preselect CCA A1A1 and local oscillator CCA A1A2 are interdependent and must be adjusted as a unit. After completing CCA A1A1 adjustment, perform CCA A1A2 adjustment.

5.7.1.1 RF PRESELECT CCA A1A1. RF preselect CCA A1A1 consists of four voltage-tuned bandpass filters, each containing two sections. Adjustments are made by adjusting tuning slugs on iron-core coils and by adjusting the dimensions and spacing of free-standing air-core coils.

CAUTION

Ensure that power is not applied to the Receiver Test Set during equipment setup.

NOTE

Alignment of preselect bands 1 thru 4 is outlined in the following steps. This outline should be considered only as a guide. The technician must determine what is acceptable performance since each preselect has its own minor differences. The frequency coverage of each band is the overriding concern and the tuning voltage needed to reach that goal is of little concern as long as it (TV) remains within absolute limits (0.5 to 34 V). These numbers are the approximate limits of the loop amplifier range and dictate the preselect limit. Some leeway should be left at each end of each band for temperature effects.

a. Equipment Setup. Complete equipment setup as follows:

(1) Remove covers from the R-5076/U.

(2) Connect equipment as shown in figure 5-6.

b. Equipment Control Settings. Before beginning adjustments, set equipment controls as follows:

(1) Receiver Test Set controls:

Leverwheel switch B to 3, C to 6
Leverwheel switches A, D, E, and F to 0
MGC/AGC toggle switch - Down (AGC on)
AM/FM toggle switch - Down (FM on)
IF BW toggle switches for 0, 0 code (NB IF)
ALC toggle switch - Down (ALC off)
SQLCH toggle switch - Down (SQLCH off)
Meter select switch - 0-36V
0-36V TV - 02.00 V dc (TV set to 30V).

(2) Spectrum analyzer controls:

FREQUENCY - 36.000 MHz
BANDWIDTH - 300 kHz
SCAN WIDTH - 2 MHz/div
INPUT ATTENUATION - Zero
SCAN TIME PER DIVISION - 1 MS
LOG REF LEVEL - 0 dBm
2 DB LOG/10 DB LOG/LINEAR - 10 DB LOG
LOG REF LEVEL vernier dial - Zero
VIDEO FILTER - OFF
SCAN MODE - INT
SCAN TRIGGER - AUTO

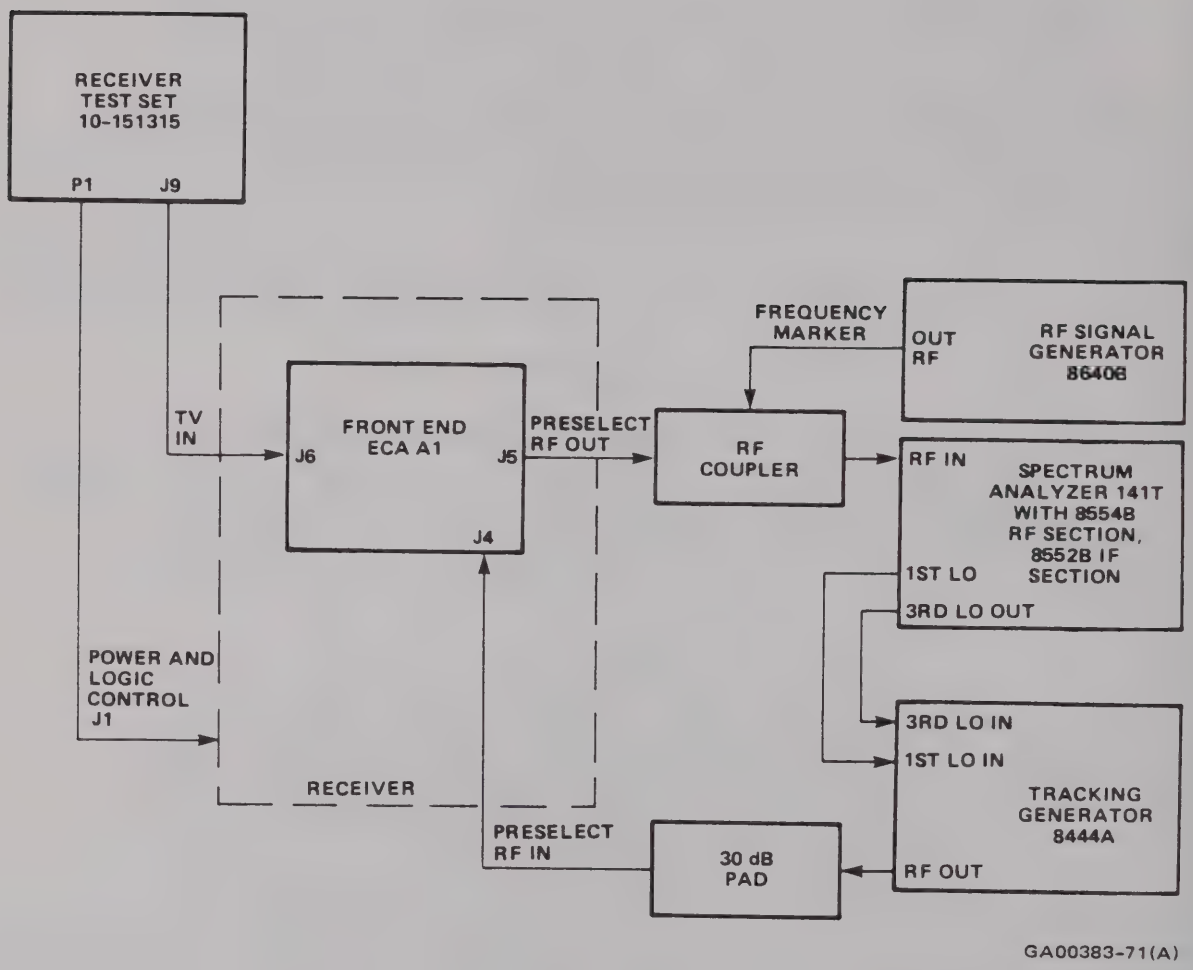


Figure 5-6. RF Preselect CCA AlAl Adjustment Setup

(3) RF signal generator controls:

FREQUENCY - 36.000 MHz
RF OUTPUT LEVEL - -30 dBm
Modulation - All modulation controls off
RF OUTPUT - ON

c. Calibration of Adjustment Equipment. The tracking generator output is connected to the spectrum analyzer input port through the test cables and calibrated to establish a -30-dB reference, which includes cable losses. Perform the calibration as follows:

(1) Disconnect cables at ECA A1 J4 (input) and A1 J5 (output).

(2) Use an adapter to connect the two disconnected cable ends.

(3) Turn the tracking generator POWER switch ON and set the tracking generator LEVEL control to 0 dB. A straightline display is presented slightly below the -30-dB level on the spectrum analyzer.

(4) Adjust the spectrum analyzer FREQUENCY control to place the pip generated by the RF signal generator on the display centerline.

(5) Turn the RF signal generator RF OUTPUT switch to OFF and verify that the pip disappears. Adjust the tracking generator TRACK ADJ control to obtain the highest level on the spectrum analyzer display.

(6) Adjust the spectrum analyzer LOG REF LEVEL vernier dial to bring the display line up to -30 dB. Use this as the reference level for the following gain measurements.

CAUTION

Use only orangewood sticks and smooth-jawed long-nose pliers to adjust air-core coils. Damage to the coils is possible if other tools are used.

NOTE

Best results are obtained when the general appearance of the aligned coils is neat and orderly.

d. Band 1 Adjustments. Check band 1 to ensure that the frequency range is sufficient, the gain is proper, and the coupling is proper to obtain an acceptable bandpass. Perform adjustments by tuning coils L3, L6, L12, and L15 with center tuning slugs, and by

physically adjusting coils L4, L5, and L14. See figure 5-7 for coil locations on CCA A1A1.

NOTE

Because any coil adjustments affect all three parameters (frequency range, gain, and coupling), read steps (1) thru (15), below, before starting adjustment.

(1) Reconnect the equipment setup as shown in figure 5-6.

(2) Tune the RF signal generator to 36.000 MHz and turn RF signal generator RF OUTPUT switch to ON.

(3) Check the upper frequency limit by observing the RF signal generator-generated pip location in relation to the preselect output on the spectrum analyzer display, If the pip location is to the right of the output signal, the preselect is tuned lower than 36.0 MHz. Verify the Receiver Test Set 0-36V supply is 30.0 volts. If the pip is to the left of the output signal (preselect tuned above 36.0 MHz at 30.0 tuning volts), adjust coils L3, L6, L12, and L15 with center tuning slugs, and adjust coils L4, L5, L13, and L14 to bring the upper band edge down to 36.0 MHz. Use a trial-and-error approach when tuning to the desired frequency range. (See figure 5-8.)

(4) After the upper frequency limit is checked and adjusted (if necessary), check gain to ensure a maximum output level >+12 (±2) dB. Adjust L3 thru L6 and L12 thru L15 to obtain an acceptable gain.

(5) Adjust L3 thru L6 and L12 thru L15 to obtain desired bandpass shape. The optimum shape is sharply defined skirts on each side and a relatively flat peak across the top 3 dB of the display. This peak is typically 2.8 MHz wide (7.7 percent of 36 MHz). See figure 5-8 for examples of desired display and out-of-tune displays.

(6) Adjust the Receiver Test Set 0-36V supply down to approximately 2.00 V dc (whatever TV is required to tune the first band voltage-tuned filter (VTF) down to 20 MHz).

(7) Set the RF signal generator output frequency to 20 MHz for the frequency marker.

(8) Tune the spectrum analyzer to 20 MHz and center the pip (frequency marker) on the display.

(9) Check the lower frequency limit by observing the RF signal generator-generated pip location in relation to the

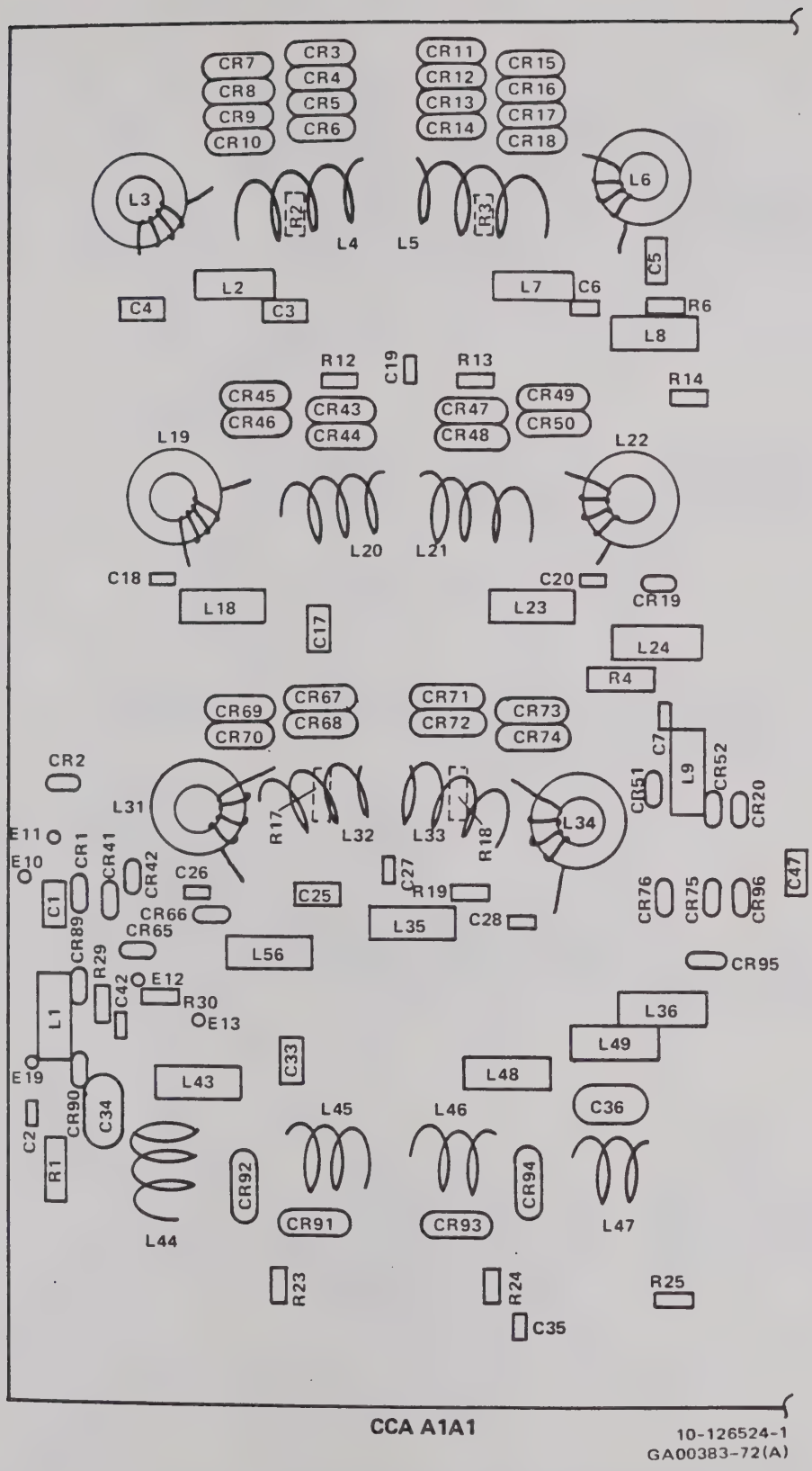
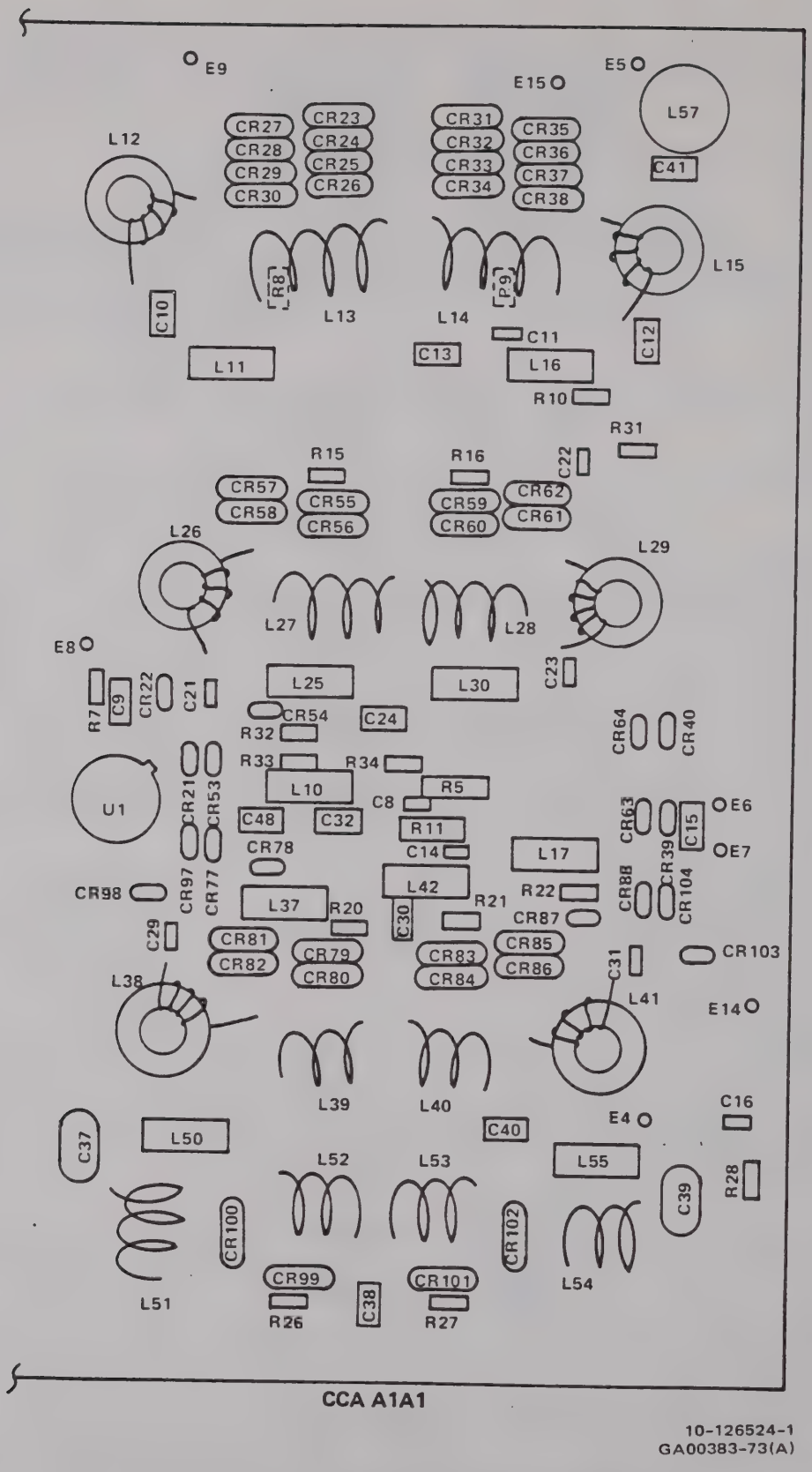


Figure 5-7. RF Preselect CCA AlAl Adjustment Locations (Sheet 1 of 2)



CCA A1A1

10-126524-1
GA00383-73(A)

Figure 5-7. RF Preselect CCA A1A1 Adjustment Locations (Sheet 2 of 2)

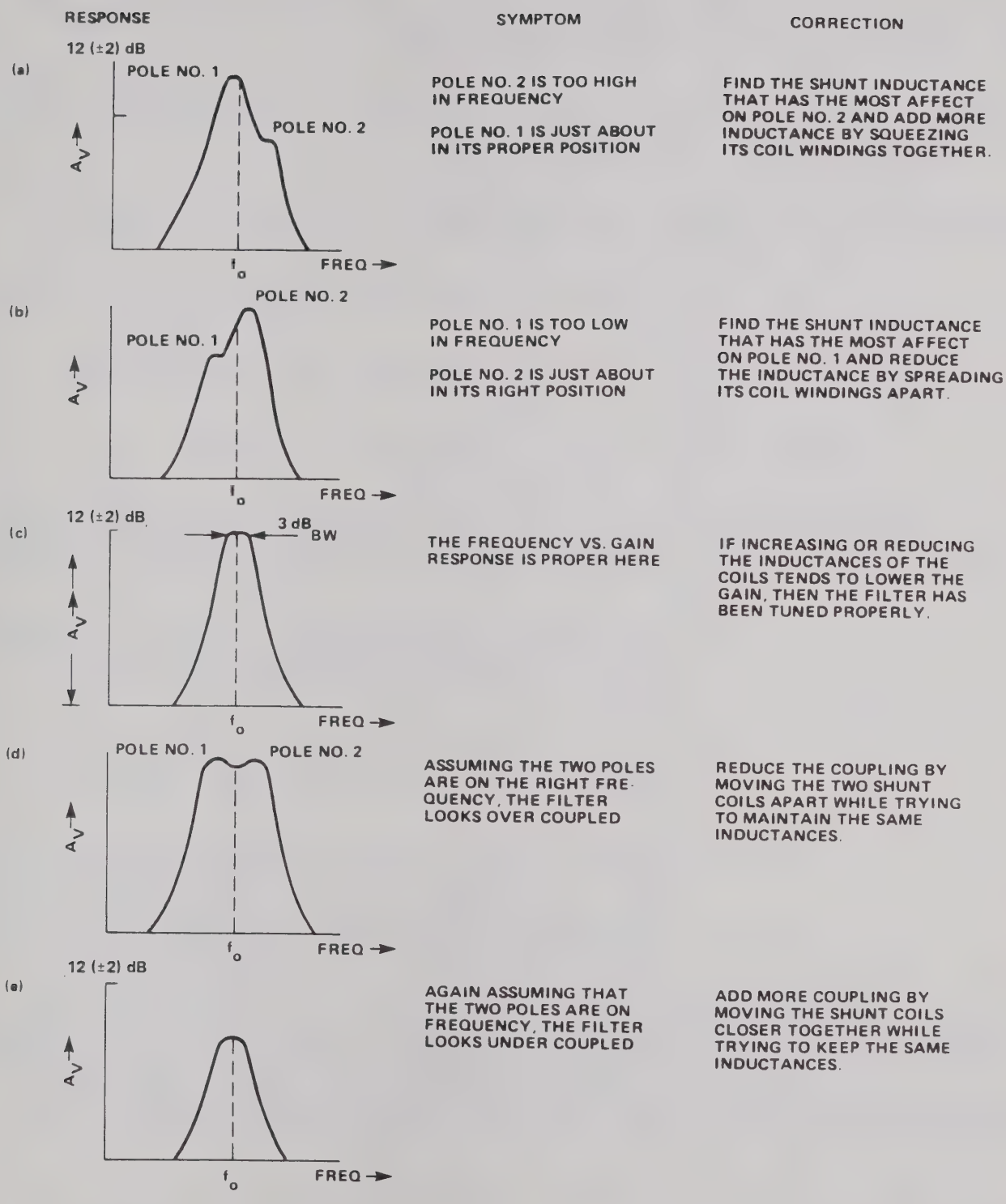

RESPONSE
SYMPTOM
CORRECTION
(a)
12 (±2) dB
POLE NO. 1
POLE NO. 2
A_V
f_o
FREQ
POLE NO. 2 IS TOO HIGH IN FREQUENCY
POLE NO. 1 IS JUST ABOUT IN ITS PROPER POSITION
FIND THE SHUNT INDUCTANCE THAT HAS THE MOST AFFECT ON POLE NO. 2 AND ADD MORE INDUCTANCE BY SQUEEZING ITS COIL WINDINGS TOGETHER.
(b)
POLE NO. 2
POLE NO. 1
POLE NO. 1 IS TOO LOW IN FREQUENCY
POLE NO. 2 IS JUST ABOUT IN ITS RIGHT POSITION
FIND THE SHUNT INDUCTANCE THAT HAS THE MOST AFFECT ON POLE NO. 1 AND REDUCE THE INDUCTANCE BY SPREADING ITS COIL WINDINGS APART.
(c)
12 (±2) dB
3 dB BW
THE FREQUENCY VS. GAIN RESPONSE IS PROPER HERE
IF INCREASING OR REDUCING THE INDUCTANCES OF THE COILS TENDS TO LOWER THE GAIN, THEN THE FILTER HAS BEEN TUNED PROPERLY.
(d)
POLE NO. 1
POLE NO. 2
ASSUMING THE TWO POLES ARE ON THE RIGHT FREQUENCY, THE FILTER LOOKS OVER COUPLED
REDUCE THE COUPLING BY MOVING THE TWO SHUNT COILS APART WHILE TRYING TO MAINTAIN THE SAME INDUCTANCES.
(e)
12 (±2) dB
AGAIN ASSUMING THAT THE TWO POLES ARE ON FREQUENCY, THE FILTER LOOKS UNDER COUPLED
ADD MORE COUPLING BY MOVING THE SHUNT COILS CLOSER TOGETHER WHILE TRYING TO KEEP THE SAME INDUCTANCES.
GA00383-74(A)

Figure 5-8. RF Preselect CCA A1A1 Response Curves

preselect output on the spectrum analyzer display. If the pip is to the left of the output signal (preselect tuned higher than 20 MHz), adjust the Receiver Test Set 0-36V supply downward to bring the pip onto the output signal. If the pip is to the right of the output signal the preselect is tuned below 20 MHz.

(10) After the lower frequency is checked, check gain to ensure a minimum output level >+12 (±2) dB. Adjust L3 thru L6 and L12 thru L15 to obtain an acceptable gain.

(11) Adjust L3 thru L6 and L12 thru L15 as required to obtain the desired bandpass shape as shown in figure 5-8. The display 3 dB BW will typically be 1.4 MHz wide (7.2 percent of 20 MHz).

(12) Set Receiver Test Set 0-36V supply to 30.00 V dc. Tune spectrum analyzer to 60 MHz.

(13) Repeat steps (2) thru (12), above, until both ends of band 1 are properly adjusted.

(14) Set RF signal generator to 36.000 MHz.

(15) Gradually decrease Receiver Test Set 0-36V supply setting and RF signal generator frequency while observing spectrum analyzer display. Band 1 adjustments may be considered satisfactory if the following conditions are met:

(a) The lower frequency limit (20 MHz) is tunable with 2.0 volts or greater and the upper frequency limit (36 MHz) is tunable with 30 volts.

(b) An output level >+12 (±2) dB is maintained throughout the frequency range. (Refer to figure 5-9.)

(c) Proper bandpass shape is maintained throughout the frequency range and the bandpass peak is approximately 6 percent of the tuned frequency at 36 MHz and approximately 11 percent of the tuned frequency at 20 MHz.

e. Band 2 Adjustments. Check band 2 to ensure that the frequency range is sufficient, gain is proper, and coupling is proper to obtain an acceptable bandpass. Perform adjustment by tuning coils L19, L22, L26, and L29 with center tuning slugs, and by physically adjusting coils L20, L21, L27, and L28. See figure 5-7 for coil locations on CCA A1A1.

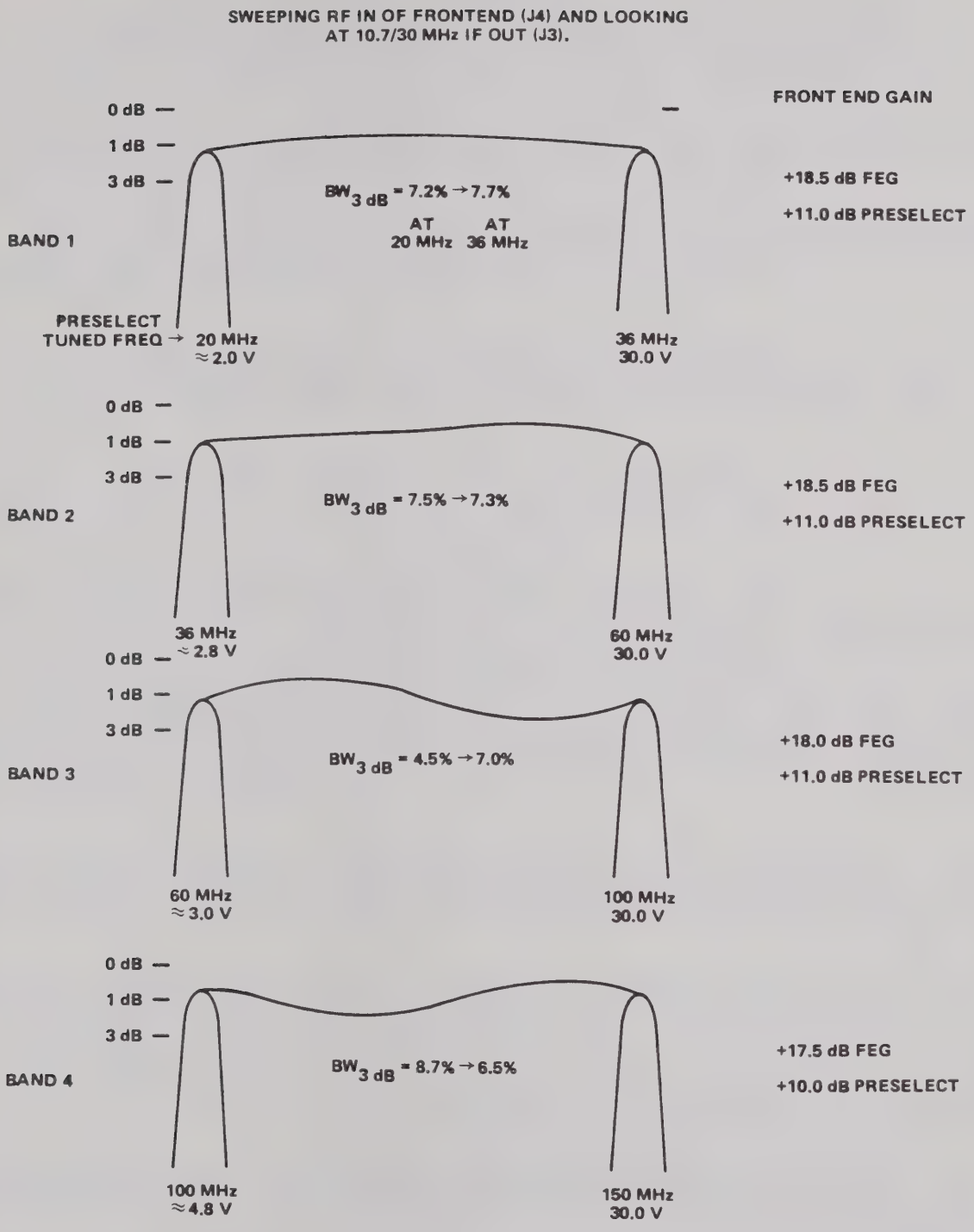


Figure 5-9. Front End/Frequency Response

NOTE

Because any coil adjustments affect all three parameters (frequency range, gain, and coupling), read steps (1) thru (20), below before starting adjustment.

(1) Set RF signal generator to 60.000 MHz.

(2) Perform equipment calibration as described in paragraph 5.7.1.1 c, above.

(3) Reconnect the equipment setup as shown in figure 5-7.

(4) Set Receiver Test Set leverwheel switches B to 6, and A and C to 0 (selects band 2 voltage tuned filter).

(5) Set Receiver Test Set 0-36V supply to 30.000 V dc.

(6) Set RF signal generator to 60 MHz and turn RF signal generator RF OUTPUT switch to ON.

(7) Check the upper frequency limit by observing the RF signal generator-generated pip location in relation to the pre-select output of the spectrum analyzer display. If the pip is to the right of the output signal the preselect is trned lower than 60 MHz. If the pip is to the left of the output signal (preselect tuned above 60 MHz at 30.00 tuning volts), adjust L19 thru L22 and L26 thru L29 to bring the upper band edge down to 60 MHz. Use a trial-and-error approach when tuning to obtain the desired frequency range. (Refer to figure 5-8.)

(8) After the upper frequency limit is checked and adjusted (if necessary), check gain to ensure a minimum output level $\geq$+12 (±2) dB. Adjust L19 thru L22 and L26 thru L29 to obtain acceptable gain.

(9) Adjust L19 thru L22 and L26 thru L29 to obtain desired bandpass shape. The optimum shape has sharply defined skirts on each side and a relatively flat peak across the top 3 dB of the display. This peak is typically 4.4 MHz wide (7.3 percent of 60 MHz). See figure 5-8 for examples of the desired display and out-of-tune displays.

(10) Adjust the Receiver Test Set 0-36V supply down to approximately 2.8 V dc (whatever TV is required to tune second band VTF down to 36 MHz).

(11) Set RF signal generator output frequency to 36 MHz for the frequency marker.

(12) Tune the spectrum analyzer to 36 MHz and center the pip (frequency marker) on the display.

(13) Check the lower frequency limit by observing the RF signal generator-generated pip location in relation to the preselect output on the spectrum analyzer display. If the pip is to the left the output signal (preselect tuned higher than 36 MHz), adjust the Receiver Test Set 0-36V supply downward to bring the pip onto the output signal. If the pip is to the right of the output signal the preselect is tuned below 36 MHz.

(14) After the lower frequency limit is checked, check gain to ensure a minimum output level $\geq$+12 ($\pm$2) dB. Adjust L19 thru L22 and L26 thru L29 to obtain acceptable gain.

(15) Adjust L19 thru L22 and L26 thru L29 as required to obtain the desired bandpass shape as shown in figure 5-8. The display 3 dB BW will typically be 2.7-MHz wide (7.5 percent of 36 MHz).

(16) Tune spectrum analyzer to 60 MHz.

(17) Repeat steps (5) thru (16), above, until both ends of band 2 are properly adjusted.

(18) Set Receiver Test Set 0-36V supply to 30.00 V dc.

(19) Set RF signal generator to 60 MHz.

(20) Gradually decrease Receiver Test Set 0-36V supply setting and RF signal generator frequency while observing spectrum analyzer display. Band 2 adjustments may be considered satisfactory under the following conditions:

(a) The lower frequency limit (36 MHz) is tunable with 2.0 volts or greater and the upper frequency limit (60 MHz) is tunable with 30 volts.

(b) An output level $\geq$+12 ($\pm$2) dB is maintained throughout the frequency range. (Refer to figure 5-9.)

(c) Proper bandpass shape is maintained throughout the range and the bandpass peak is approximately 7.3 percent of the tuned frequency at 60 MHz and approximately 7.5 percent of the tuned frequency at 36 MHz.

f. Band 3 Adjustments. Check band 3 to ensure that the frequency range is sufficient, gain is proper, and coupling is proper to obtain an acceptable bandpass. Perform adjustment by tuning coils L31, L34, L38, and L41 with center tuning slugs, and by physically adjusting coils L32, L33, L39, and L40. See figure 5-7 for coil locations on CCA A1A1.

NOTE

Because any coil adjustments affect all three parameters (frequency range, gain, and coupling), read steps (1) thru (20), below, before starting adjustment.

(1) Set RF signal generator to 100.000 MHz.

(2) Perform equipment calibration as described in paragraph 5.7.1.1 c, above.

(3) Reconnect the equipment setup as shown in figure 5-6.

(4) Set Receiver Test Set leverwheel switches A to 1 and B to 0. (Selects band 3 voltage tuned filter.)

(5) Set Receiver Test Set 0-36V supply to 30.00 V dc.

(6) Set RF signal generator to 100 MHz and turn RF signal generator RF OUTPUT switch to ON.

(7) Check the upper frequency limit by observing the RF signal generator-generated pip location in relation to the preselect output of the spectrum analyzer display. If the pip is to the right of the output signal the preselect is tuned lower than 100 MHz. If the pip is to the left of the output signal (preselect tuned above 100 MHz at 30.00 tuned volts), adjust L31 thru L34 and L38 thru L41 to bring the upper band edge down to 100 MHz. Use a trial-and-error approach when tuning to obtain the desired frequency range. (Refer to figure 5-8.)

(8) After the upper frequency limit is checked and adjusted (if necessary), check gain to ensure a minimum output level $\geq$+12 (±2) dB. Adjust L31 thru L34 and L38 thru L41 to obtain an acceptable gain.

(9) Adjust L31 thru L34 and L38 thru L41 to obtain desired bandpass shape. The optimum shape has sharply defined skirts on each side and a relatively flat peak across the top 3 dB of the display. This peak is typically 7 MHz wide (7 percent of 100 MHz). See figure 5-8 for examples of the desired display and out-of-tune displays.

(10) Adjust the Receiver Test Set 0-36V supply down to approximately 3.0 V dc (whatever TV is required to tune third band VTF down to 60 MHz).

(11) Set RF signal generator output frequency to 60 MHz for the frequency marker.

(12) Tune the spectrum analyzer to 60 MHz and center the pip (frequency marker) on the display.

(13) Check the lower frequency limit by observing the RF signal generator-generated pip location in relation to the preselect output on the spectrum analyzer display. If the pip is to the left the output signal (preselect tuned higher than 60 MHz), adjust the Receiver Test Set 0-36V supply downward to bring the pip onto the output signal. If the pip is to the right of the output signal the preselect is tuned below 60 MHz.

(14) After the lower frequency limit is checked, check gain to ensure a minimum output level $\geq$+12 ($\pm$2) dB. Adjust L31 thru L34 and L38 thru L41 to obtain acceptable gain.

(15) Adjust L31 thru L34 and L38 to L41 as required to obtain the desired bandpass shape as shown in figure 5-8. The display peak 3 dB BW will typically be 4.5 MHz wide (7.5 percent of 60 MHz).

(16) Tune spectrum analyzer to 100 MHz.

(17) Repeat steps (5) thru (16), above, until both ends of band 3 are properly adjusted.

(18) Set Receiver Test Set 0-36V supply to 30.00 V dc.

(19) Set RF signal generator to 100 MHz.

(20) Gradually decrease Receiver Test Set 0-36V supply setting and RF signal generator frequency while observing spectrum analyzer display. Band 3 adjustments may be considered satisfactory under the following conditions:

(a) The lower frequency limit (60 MHz) is tunable with 2.0 volts or greater and the upper frequency limit (100 MHz) is tunable with 30 volts.

(b) An output level $\geq$+12 ($\pm$2) dB is maintained throughout the range. (Refer to figure 5-9.)

(c) Proper bandpass shape is maintained throughout the range and the bandpass peak is approximately 7 percent of the tuned frequency at 100 MHz and approximately 7.5 percent of the tuned frequency at 60 MHz.

g. Band 4 Adjustments. Check band 4 to ensure that the frequency range is sufficient, gain is proper, and coupling is proper to obtain an acceptable bandpass. Perform adjustment of coils L44 thru L47 and L51 thru L54 by physically adjusting coils. See figure 5-7 for coil locations on CCA A1A1.

NOTE

Because any coil adjustments affect all three parameters (frequency range, gain, and coupling), read steps (1) thru (20), below, before starting adjustment.

(1) Set RF signal generator to 150.000 MHz.

(2) Perform equipment calibration as described in paragraph 5.7.1.1 c, above.

(3) Reconnect the equipment setup as shown in figure 5-6.

(4) Set Receiver Test Set leverwheel switches A to 1, B to 5, and C to 0 (selects band 3 voltage tuned filter).

(5) Set Receiver Test Set 0-36V supply to 30.00 V dc.

(6) Set RF signal generator to 150 MHz and turn RF signal generator RF OUTPUT switch to ON.

(7) Check the upper frequency limit by observing the RF signal generator-generated pip location in relation to the preselect output of the spectrum analyzer display. If the pip is to the right of the output signal, the preselect is tuned lower than 150 MHz. If the pip is to the left of the output signal (preselect tuned above 150 MHz at 30.00 tuning volts), adjust L44 thru L47 and L51 thru L54 to bring the upper band edge down to 150 MHz. Use a trial-and-error approach when tuning to obtain the desired frequency range. (Refer to figure 5-8.)

(8) After the upper frequency limit is checked and adjusted (if necessary), check gain to ensure a minimum output level $\geq$+12 (±2) dB. Adjust L44 thru L47 and L51 thru L54 to obtain an acceptable gain.

(9) Adjust L44 thru L47 and L51 thru L54 to obtain desired bandpass shape. The optimum shape has sharply defined skirts on each side and a relatively flat peak across the top 3 dB of the display. This peak is typically 9.8 MHz wide (6.5 percent of 150 MHz). See figure 5-8 for examples of the desired display and out-of-tune displays.

(10) Adjust the Receiver Test Set 0-36V supply down to approximately 4.8 V dc (whatever TV is required to tune fourth band VTF down to 100 MHz).

(11) Set RF signal generator output frequency to 100 MHz for the frequency marker.

(12) Tune the spectrum analyzer to 100 MHz and center the pip (frequency marker) on the display.

(13) Check the lower frequency limit by observing the RF signal generator-generated pip location in relation to the preselect output on the spectrum analyzer display. If the pip is to the left of the output signal (preselect tuned higher than 100 MHz), adjust the Receiver Test Set 0-36V supply downward to bring the pip onto the output signal. If the pip is to the right of the output signal, the preselect is tuned below 100 MHz.

(14) After the lower frequency range is checked, check gain to ensure a minimum output level $\geq$+12 (±2) dB. Adjust L44 thru L47 and L51 thru L54 to obtain acceptable gain.

(15) Adjust L44 thru L47 and L51 thru L54 as required to obtain the desired bandpass shape as shown in figure 5-8. The display peak 3 dB BW will typically by 8.7 MHz wide (8.7 percent of 100 MHz).

(16) Tune spectrum analyzer to 150 MHz.

(17) Repeat steps (5) thru (16), above, until both ends of band 4 are properly adjusted.

(18) Set Receiver Test Set 0-36V supply to 30.00 V dc.

(19) Set RF signal generator to 150 MHz.

(20) Gradually decrease Receiver Test Set 0-36V supply setting and RF signal generator frequency while observing spectrum analyzer display. Band 4 adjustments may be considered satisfactory under the following conditions:

(a) The lower frequency limit (100 MHz) is tunable with 2.0 volts or greater, and the upper frequency limit (150 MHz) is tunable with 30 volts.

(b) An output level $\geq$+12 (±2) dB is maintained throughout the range. (Refer to figure 5-9.)

(c) Proper bandpass shape is maintained throughout the range, and the bandpass peak is approximately 8.7 percent of the tuned frequency at 100 MHz and 6.5 percent of the tuned frequency at 150 MHz.

5.7.1.2 LOCAL OSCILLATOR CCA A1A2. Local oscillator CCA A1A2 contains five local oscillator (LO) circuits, one for each of the five preselector bands. The LO circuits are first tuned to the lower and upper band edge frequencies within the synthesizer tuning voltage range. The test setup is then changed to match the LO output against the preselect tuning voltage response.

CAUTION

Ensure that power is not applied to the Receiver Test Set during equipment setup.

NOTE

If a failure occurs in either preselect CCA A1A1 or local oscillator (LO) CCA A1A2 that requires changing a varactor, it may be necessary to retrack the preselect to the LO. If the characteristics of the new component differ much from the old component, then the tracking procedure listed below will not be able to compensate for the change. When this happens, the LO will appear to tune slower or faster than the preselect. To correct this, the coupling capacitor between the varactors and the transformer of the individual LO circuits must be "factory selected." A larger capacitor will make the LO tune faster in relationship to the preselect. Therefore, a smaller capacitor will make the LO tune slower. The coupling capacitor for each LO band is as follows:

Band 1 - C2
Band 2 - C8
Band 3 - C14
Band 4 - C20

Trial and error will accomplish this task. The value of the capacitor will change less than 15 percent.

a. Equipment Setup. Complete equipment setup as follows:

(1) Remove covers from the R-5076/U.

(2) Connect equipment as shown in figure 5-10.

(3) Connect a test cable from A1J7 to the RF signal generator COUNTER INPUT.

b. Equipment Control Settings. Before beginning adjustments, set equipment controls as follows:

(1) Receiver Test Set controls:

Leverwheel switches B to 2 and
A, C, D, E, and F to (Band 1 ON)
AGC/MGC toggle switch - NA
AM/FM toggle switch - NA
IF BW toggle switches - NA

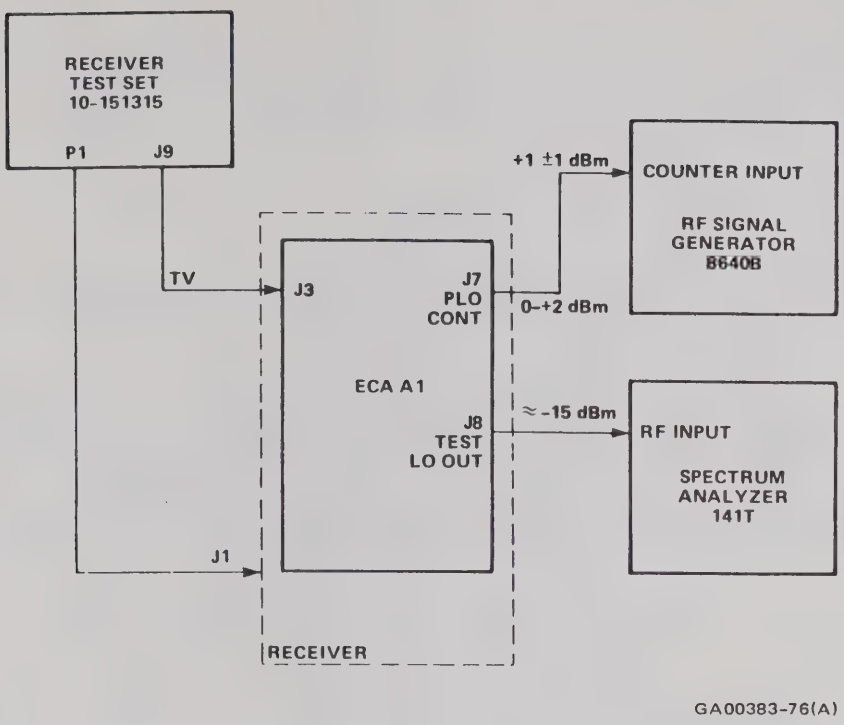


Figure 5-10. LO CCA A1A2 Preliminary Adjustment Setup

ALC toggle switch - NA
SQLCH toggle switch - NA
SUPPLY-SIGNAL MONITOR to 0-36V (EXT TV set to 30V)
0-36V Supply to 30.00 V dc

(2) Spectrum analyzer controls:

FREQUENCY - 46.700 MHz
BANDWIDTH - 300 kHz
SCAN WIDTH - 2 MHz/div
INPUT ATTENUATION - 20 dB
SCAN TIME PER DIVISION - 1 Ms
LOG REF LEVEL - 0 dBm
2 DB LOG/10 DB LOG/LINEAR - 10 DB LOG
LOG REF LEVEL vernier dial - 0 dB
VIDEO FILTERS - OFF
SCAN MODE - INT
SCAN TRIGGER - AUTO

(3) RF signal generator controls:

FREQUENCY - does not matter
RF OUTPUT LEVEL - -130 dBm
Modulation - All modulation controls off
RF OUTPUT - OFF
COUNTER MODE INT/EXT - EXT

CAUTION

Use only orangewood sticks and smooth-jawed long-nose pliers to adjust air-core coils. Damage to the coils is possible if other tools are used.

NOTE

Best results are obtained when the general appearance of the aligned coils is neat and orderly.

c. Band 1 Adjustment. Adjust the band 1 and band 2 LO to ensure that it produces an output 10.7 MHz above the preselect band edge frequency at both the lower and upper band edges. These settings are preliminary and will be adjusted later to coincide with the preselect responses at the same tuning voltage. See figure 5-11 for component locations.

(1) Set Receiver Test Set 0-36V supply to 30.00 V dc.

(2) Adjust A1A2 T1 to obtain 46.7 MHz on the RF signal generator COUNTER display.

(3) Set Receiver Test Set 0-36V supply to whatever tuning voltage required to tune preselector to 20 MHz in Band 1.

(4) Select a capacitance value for A1A2 C2 to obtain 30.7 MHz on the RF signal generator COUNTER display.

CAUTION

Q1 thru Q4 are field effect transistors. Work on these devices requires static sensitive handling techniques.

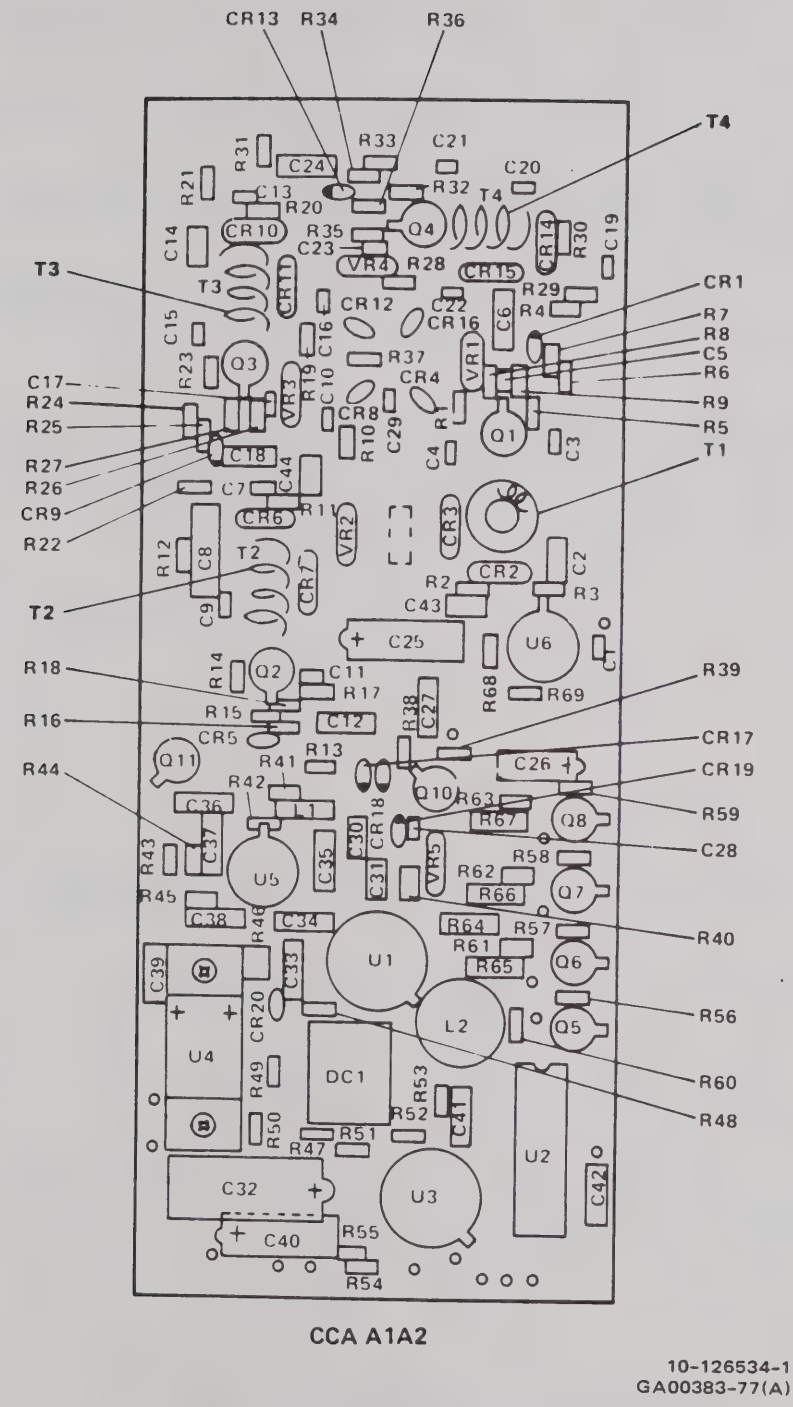
(5) Repeat steps (1) thru (4), above, until both upper and lower frequency requirements are satisfied.

(6) Using the spectrum analyzer RF INPUT verify that the LO output amplitudes are as indicated in figure 5-10 and that any spikes or spurs are 90 dB or more below the LO signal peak.

d. Band 2 Adjustment. See figure 5-11 for component locations.

(1) Set Receiver Test Set leverwheel switches A to 0, B to 3, and C to 6. (Selects band 2.)

(2) Set Receiver Test Set 0-36V supply to 30.00 V dc.



CCA A1A2

10-126534-1
GA00383-77(A)

Figure 5-11. Local Oscillator CCA A1A2 Adjustment Locations

(3) Adjust A1A2 T2 for 70.7 MHz on the RF signal generator COUNTER display.

(4) Set Receiver Test Set 0-36V supply to whatever tuning voltage required to tune preselector to 36 MHz in band 2.

(5) Select a capacitance for A1A2 C8 for 46.7 MHz on the RF signal generator COUNTER display.

(6) Repeat steps (2) thru (5), above, until both upper and lower frequency requirements are satisfied.

(7) Using the spectrum analyzer RF INPUT, verify that the LO output amplitudes are as indicated in figure 5-8 and that any spikes or spurs are 90 dB or more below the LO signal peak.

e. Band 3 Adjustment. Adjust the band 3 and 4 LO to ensure that it produces an output 30 MHz above the preselect band edge frequency at both the lower and upper band edges. These settings are preliminary and will be adjusted later to coincide with the preselect responses at the same tuning voltage. See figure 5-11 for component locations.

(1) Set Receiver Test Set leverwheel switches A to 0, B to 6, and C to 0. (Selects band 3.)

(2) Set Receiver Test Set 0-36V supply to 30.00 V dc.

(3) Adjust A1A2 T3 for 130 MHz on the RF signal generator COUNTER display.

(4) Set Receiver Test Set 0-36V supply to whatever tuning voltage required to tune preselector to 60 MHz in band 3.

(5) Select a capacitance value for A1A2 C14 for 90 MHz on the RF signal generator COUNTER display.

(6) Repeat steps (2) thru (5), above, until both upper and lower frequency requirements are satisfied.

(7) Using the spectrum analyzer RF INPUT, verify that the LO output amplitudes are as indicated in figure 5-10 and that any spikes or spurs are 90 dB or more below the LO signal peak.

f. Band 4 Adjustment. See figure 5-11 for component locations.

(1) Set Receiver Test Set leverwheel switch A to 1, B to 0, and C to 0. (Selects band 4.)

(2) Set Receiver Test Set 0-36V supply to 30.00 V dc.

(3) Adjust A1A2 T4 for 180 MHz on the RF signal generator COUNTER display.

(4) Set Receiver Test Set 0-36V supply to whatever tuning voltage required to tune preselector to 100 MHz in band 4.

(5) Select a capacitance for A1A2 C20 for 130 MHz on the RF signal generator COUNTER display.

(6) Repeat steps (2) thru (5), above, until both upper and lower frequency requirements are satisfied.

(7) Using the spectrum analyzer RF INPUT verify that the LO output amplitudes are as indicated in figure 5-8 and that any spikes or spurs are 90 dB or more below the LO signal peak.

g. Band 1 LO Tracking Adjustments.

(1) Connect equipment as shown in figure 5-12.

(2) Disconnect the RF coupler from the spectrum analyzer RF INPUT and move the RF signal generator output from the mixer to the spectrum analyzer RF INPUT port.

(3) Set RF signal generator frequency to 36.000 MHz and move RF OUT switch to ON. Center and stabilize 36-MHz signal on the spectrum analyzer display.

(4) Reconnect the equipment as shown in figure 5-12.

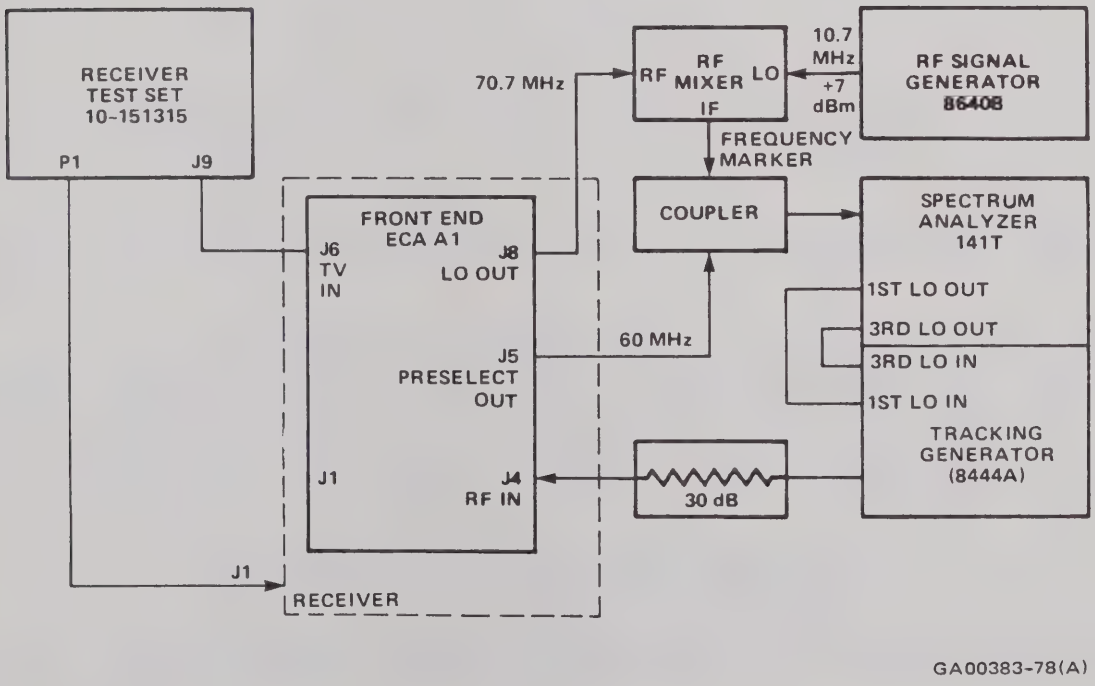


Figure 5-12. LO Tracking Adjustment Setup

(5) Set RF signal generator frequency to 10.700 MHz.

(6) Set Receiver Test Set 0-36V supply to 30.00 V dc and set leverwheel switches A to 0 and B to 2. (Selects band 1.)

(7) Adjust A1A2 T1 to bring LO output spike up onto the peak of preselect output signal. See figure 5-13 for display examples.

(8) After centering LO output on preselect output, gradually decrease Receiver Test Set 0-36V supply setting while tracking preselect/LO output display on the spectrum analyzer. Verify that LO output remains on top of preselect output throughout the band 1 range (20 to 36 MHz). LO output must appear on or above -1 dB point on preselect output signal.

h. Band 2 LO Tracking Adjustments.

(1) Disconnect the RF coupler from the spectrum analyzer RF INPUT and move the RF signal generator output from the mixer to the spectrum analyzer RF INPUT port.

(2) Set RF signal generator frequency to 60.000 MHz. Center and stabilize 60 MHz signal on the spectrum analyzer display.

(3) Reconnect the equipment setup as shown in figure 5-12.

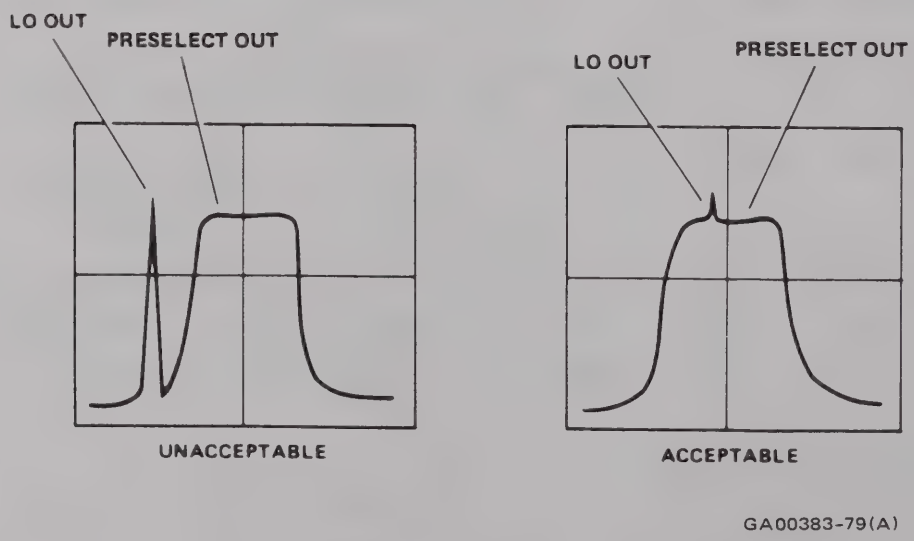


Figure 5-13. LO Tracking Adjustment Spectrum Analyzer Displays

(4) Set RF signal generator frequency to 10.7 MHz.

(5) Set Receiver Test Set 0-36V supply to 30.00 V dc and set leverwheel switches A to 0, and B and C to 4. (Selects band 2.)

(6) Adjust A1A2 T2 to bring LO output spike up onto the peak of preselect output signal. See figure 5-13 for display examples.

(7) After centering LO output on preselect output, gradually decrease Receiver Test Set 0-36V supply setting while tracking preselect/LO output display on the spectrum analyzer. Verify that LO output remains on top of preselect output throughout the band 2 range (36 to 60 MHz). LO output must appear on or above -1 dB point on preselect output signal.

i. Band 3 LO Tracking Adjustments.

(1) Disconnect the RF coupler from the spectrum analyzer RF INPUT and move the RF signal generator output from the mixer to the spectrum analyzer RF INPUT port.

(2) Set RF signal generator frequency to 100.000 MHz. Center and stabilize 100-Mhz signal on the spectrum analyzer display.

(3) Reconnect the equipment setup as shown in figure 5-12.

(4) Set RF signal generator frequency to 30.0 MHz.

(5) Set Receiver Test Set 0-36 V supply to 30.00 V dc and set leverwheel switches A to 0, B to 6, and C to 0. (Selects band 3.)

(6) Adjust A1A2 T3 to bring LO output spike up onto the peak of preselect output signal. See figure 5-13 for display examples.

(7) After centering LO output on preselect output, gradually decrease Receiver Test Set 0-36V supply setting while tracking preselect/LO output display on the spectrum analyzer. Verify that LO output remains on top of preselect output throughout the band 3 range (60 to 100 MHz). LO output must appear on or above -1 dB point on preselect output signal.

j. Band 4 LO Tracking Adjustments.

(1) Disconnect the RF coupler from the spectrum analyzer RF INPUT and move the RF signal generator output from the mixer to the spectrum analyzer RF INPUT port.

(2) Set RF signal generator frequency to 150.000 MHz. Center and stabilize 150-MHz signal on the spectrum analyzer display. Set spectrum analyzer SCAN WIDTH switch to 5 MHz/div.

(3) Reconnect the equipment setup as shown in figure 5-12.

(4) Set RF signal generator frequency to 30.0 MHz.

(5) Set Receiver Test Set 0-36V supply to 30.00 V dc and set leverwheel switches A to 1 and B to 0. (Selects band 4.)

(6) Adjust A1A2 T4 to bring LO output spike up onto the peak of preselect output signal. See figure 5-13 for display examples.

(7) After centering LO output on preselect output, gradually decrease Receiver Test Set 0-36V supply setting while tracking preselector/LO output display on the spectrum analyzer. Verify that LO output remains on top of preselect output throughout the band 4 range (100 to 150 MHz). LO output must appear on or above -1 dB point on preselect output signal.

5.7.1.3 TEST SOURCE CCA A1A4. Test source CCA A1A4 contains a 1-MHz oscillator that is adjusted as follows:

CAUTION

Ensure that power is not applied to the Receiver Test Set during equipment setup.

a. Equipment Setup. Connect equipment as shown in figure 5-14.

b. Equipment Control Settings. Before beginning adjustment, set Receiver Test Set TST TNS toggle switch to the up position.

c. Adjustment Procedure. See figure 5-15 for component locations.

(1) Connect oscilloscope to A1A4 Q1-C (R11).

(2) Adjust A1A4 L1 for a frequency counter reading of 1.000 (±0.002) MHz.

(3) Verify that source output (see figure 5-16) using spectrum analyzer.

5.7.1.4 DECODER CCA A2A2. Decoder CCA A2A2 contains one circuit, MGC offset, which requires adjustment.

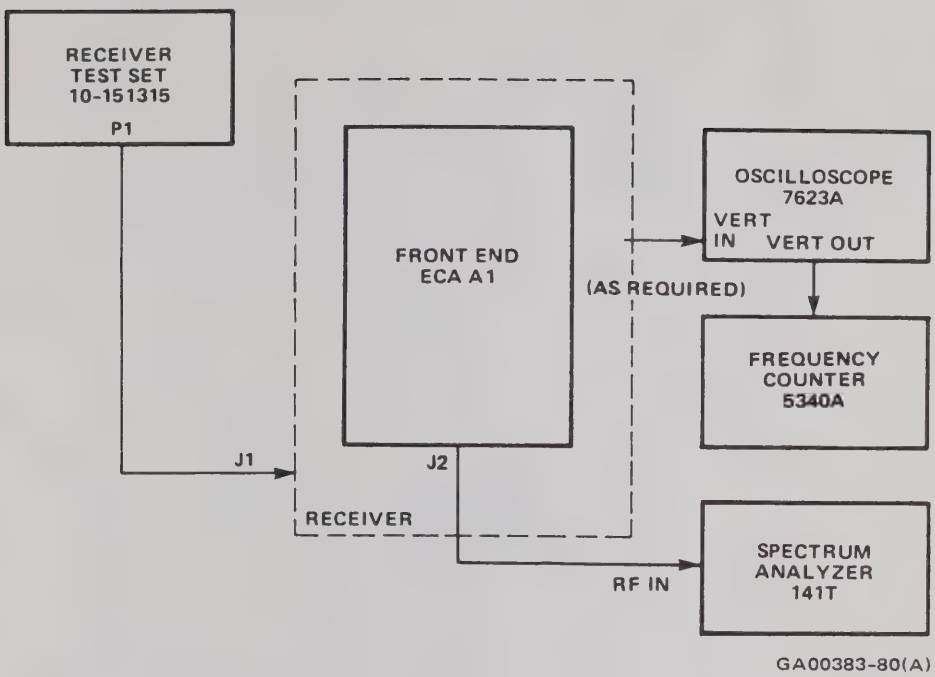


Figure 5-14. Test Source CCA A1A4 Adjustment Setup

NOTE

Adjustment of the MGC offset circuit is not required if either R14 or R15 were not installed at the factory.

CAUTION

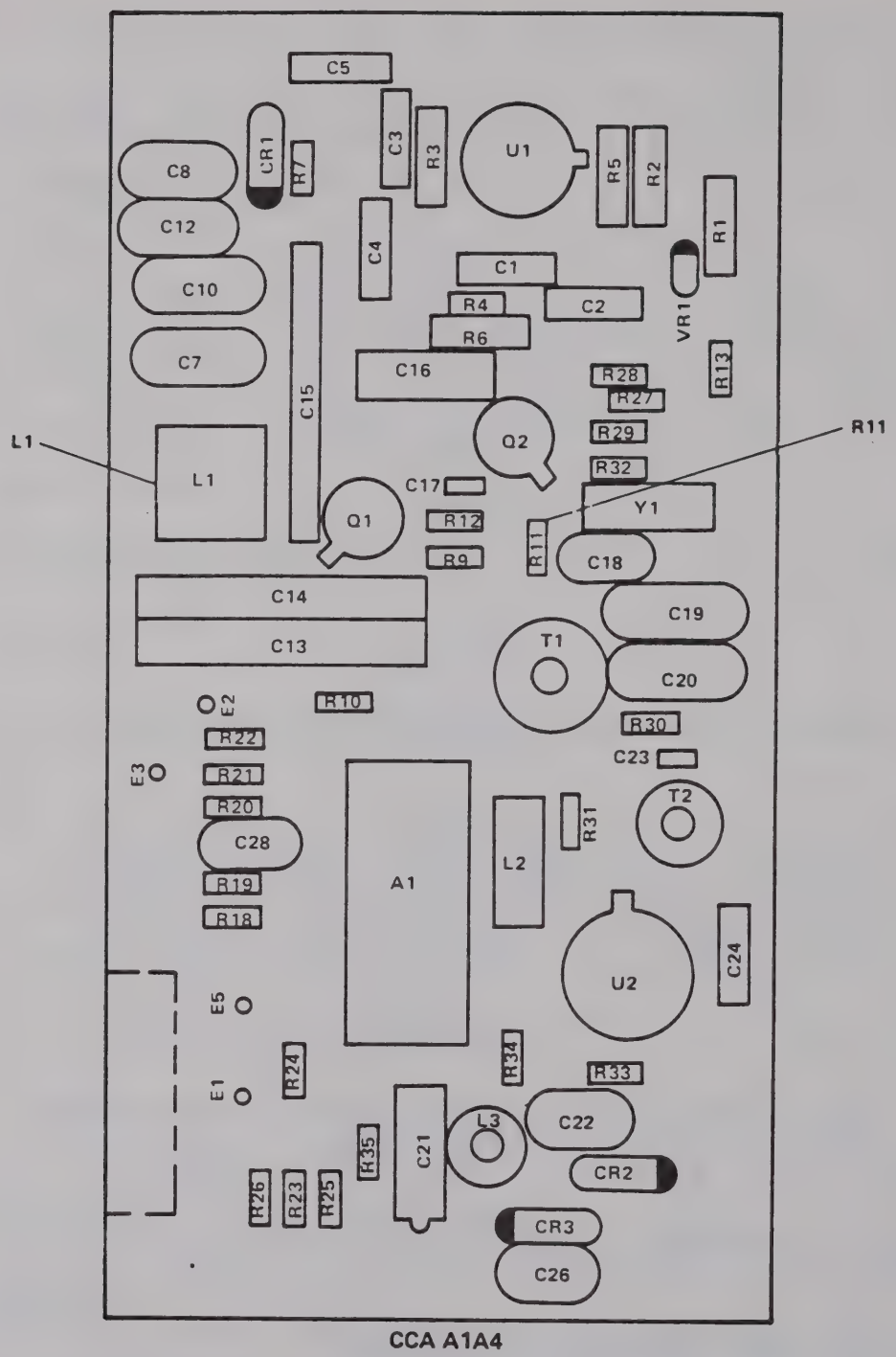
Ensure that power is not applied to the Receiver Test Set during equipment setup.

a. Equipment Setup. Connect equipment as shown in figure 5-17.

b. Equipment Control Settings. Before beginning adjustment, set equipment controls as follows:

(1) Set Receiver Test Set POWER ON toggle switch to the ON position.

(2) Set the MGC/AGC toggle switch to the up position.



CCA A1A4

10-118074-2
GA00383-81(A)

Figure 5-15. Test Source CCA A1A4 Adjustment Locations

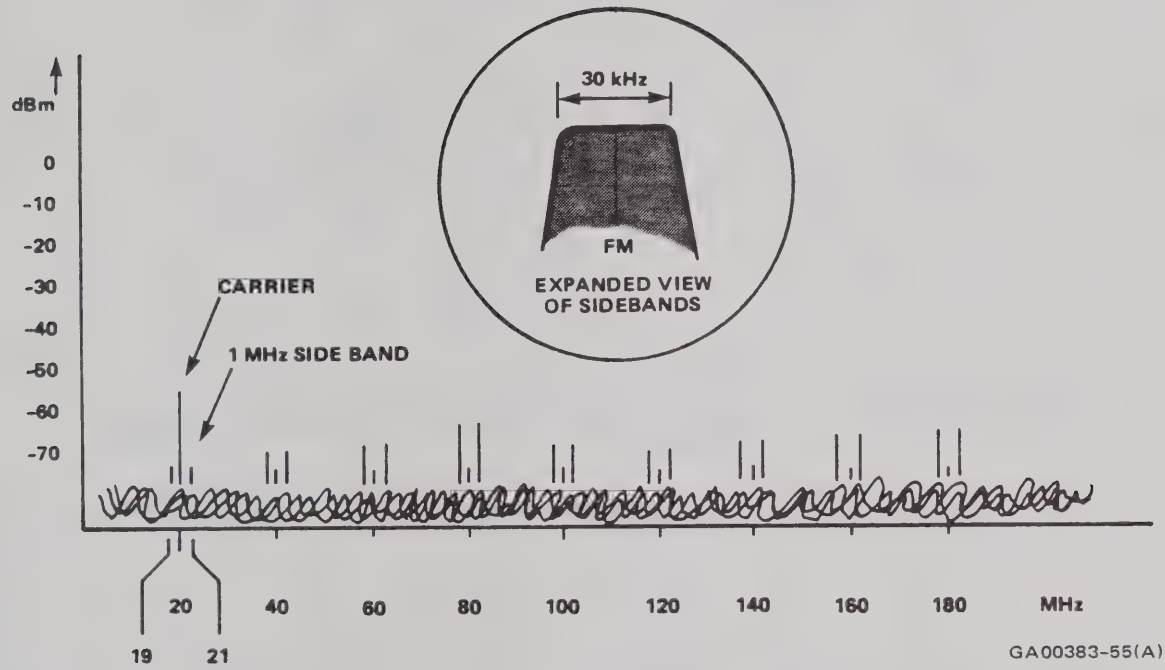


Figure 5-16. Test Source Subassembly A1A4 Frequency Spectrum (J2) Output

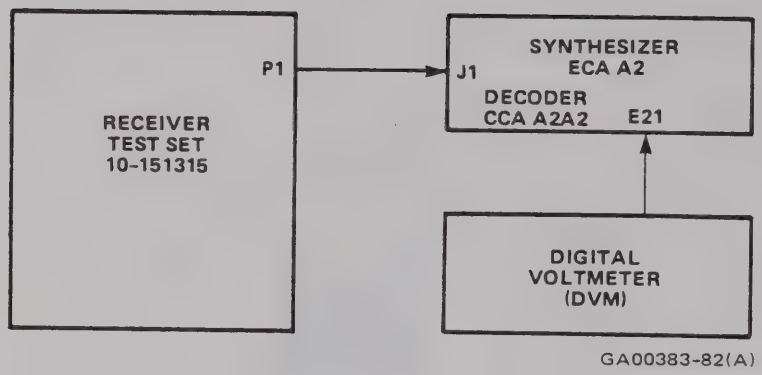


Figure 5-17. Synthesizer ECA A2 Adjustment Setup

c. Adjustment Procedure. See figure 5-18 for component locations.

(1) Set Receiver Test Set meter select switch to DVM.

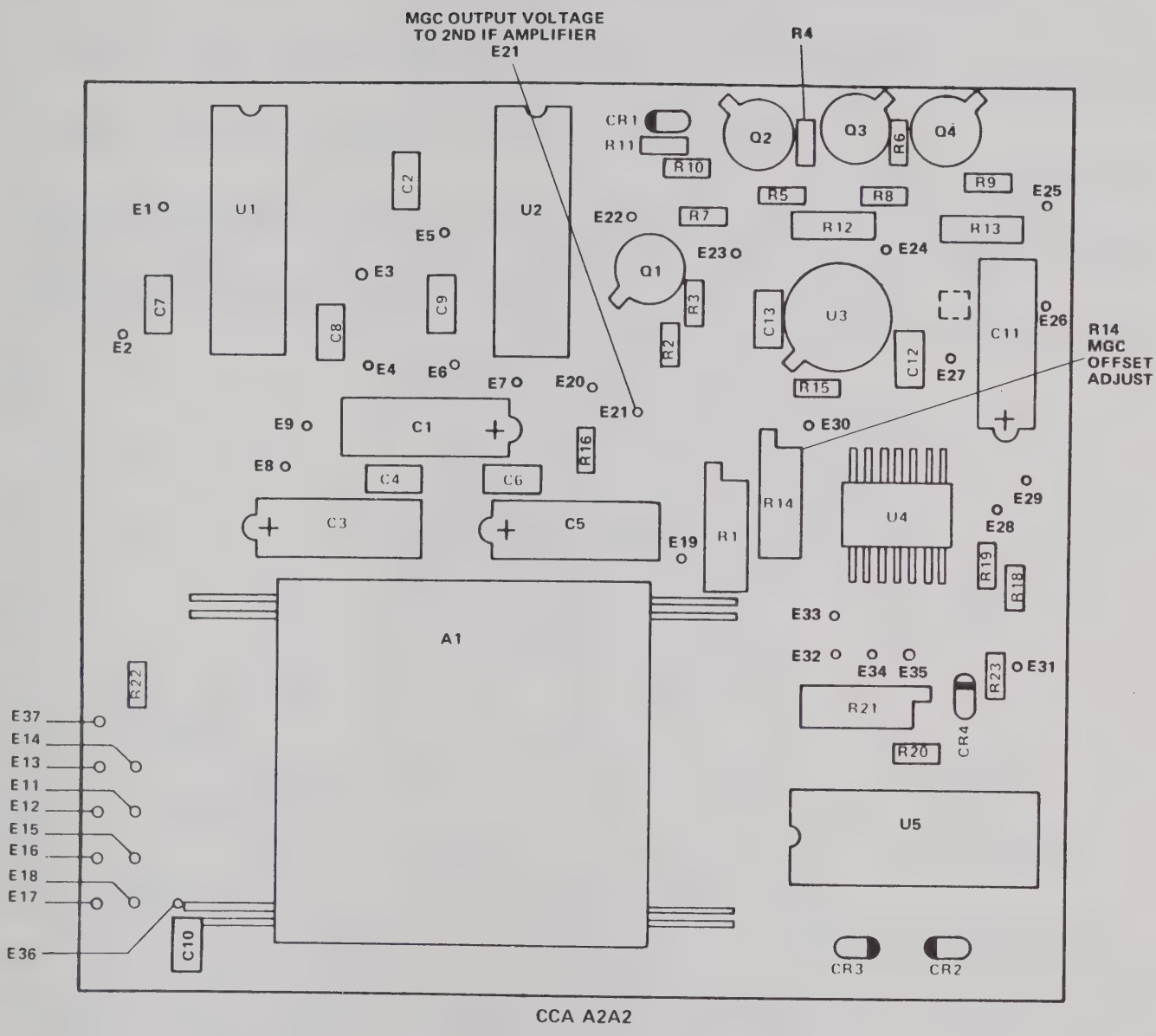
(2) Set the Receiver Test Set MGC toggle switches 1, 2, 4, 8, and 16 to the down position.

(3) Adjust A2A2 R14 as necessary for a reading of 0 (±0.5) V dc at E21 of A2A2.

NOTE

Decoder CCA A2A2 R21 (FSC TRIM) is adjusted with synthesizer ECA A2 installed in receiver during final adjustment (see paragraph 5.7.2).

5.7.1.5 FIRST AND SECOND IF AMPLIFIER/DETECTOR ECA A3. Adjustment of first and second IF amplifier/detector ECA A3 is accomplished by inductively tuning the second IF amplifier/detector CCA A3A2, AM detector input, three bandpass filters, and the 30-MHz IF frequency range and gain filters. All adjustments are made by adjusting center slugs in tunable coils.



CCA A2A2

10-123764-1
GA00383-83(A)

Figure 5-18. Decoder CCA A2A2 Adjustment Locations

CAUTION

Ensure that power is not applied to the Receiver Test Set during equipment setup.

a. Equipment Setup. Connect equipment as shown in figure 5-19, as follows:

(1) Connect first IF output (ECA A3 J5) to the spectrum analyzer input port.

(2) Connect RF input (ECA A3 J1) to the tracking generator output through a step attenuator.

b. Equipment Control Settings. Before beginning adjustments, set equipment controls as follows:

(1) Spectrum analyzer controls:

RF section:
FREQUENCY - 10.700 MHz
BANDWIDTH - 100 kHz
SCAN WIDTH - 10 kHz/div
INPUT ATTENUATION - 40 dB

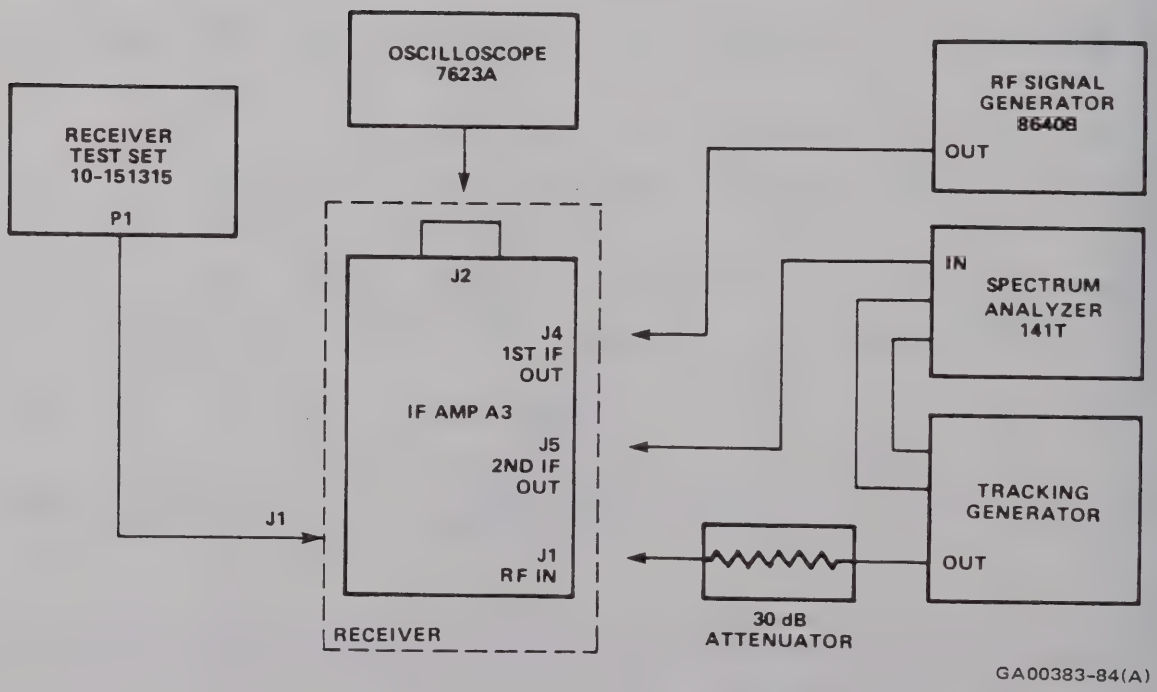


Figure 5-19. First and Second IF Amplifier/Detector ECA A3 Adjustment Setup

IF section:
BASE LINE CLIPPER - Fully ccw
SCAN TIME PER DIVISION - 1 MS
LOG REF LEVEL - 10 dB
LOF REF LEVEL vernier dial - 0 dB
VIDEO FILTER - OFF
SCAN MODE - INT
SCAN TRIGGER - AUTO

Display section - CONV

(2) Tracking generator controls. Connect tracking generator output through 30 dB attenuator to spectrum analyzer input. Set TRACK ADJ for peak signal on spectrum analyzer. Set LEVEL control for -40 dB signal on spectrum analyzer. Reconnect spectrum analyzer and tracking generator as described in a., above.

(3) Receiver Test Set controls:

Leverwheel switches B to 3 and C to 5 (Band 2)
IF BW switches for 1, 0 code (50 kHz IF BW)
ALC toggle switch - Down (ALC OFF)
MGC/AGC toggle switch up (MGC ON)
AM/FM toggle switch - Down (FM mode)
MGC toggle switches 1, 2, 4, 8, 16 to select a level that will decrease the signal on the spectrum analyzer by 5 (±2) dB (normal level is 15 (±1) dB). (Assuming IF amplifier is not saturated.)

NOTE

See figure 5-20 for adjustment locations.

c. 50-kHz Bandwidth Filter Adjustment.

(1) Reference figure 5-20 for adjustment locations.

(2) Adjust A3A1 coils L18, L23, and L24 for maximum gain with the flattest signal spectrum top displayed on the spectrum analyzer. Use a trial-and-error approach to identify the effect of each coil adjustment until the desired shape with maximum gain is attained. See figure 5-21 for bandpass display example.

d. 30-kHz Bandwidth Filter Adjustment.

(1) Set Receiver Test Set IF BW toggle switches for a 0,1 code.

(2) Adjust A3A1 coils L16 and L17 as required for maximum gain and 30-kHz bandpass shape displayed on the spectrum analyzer. See figure 5-21 for bandpass display example.

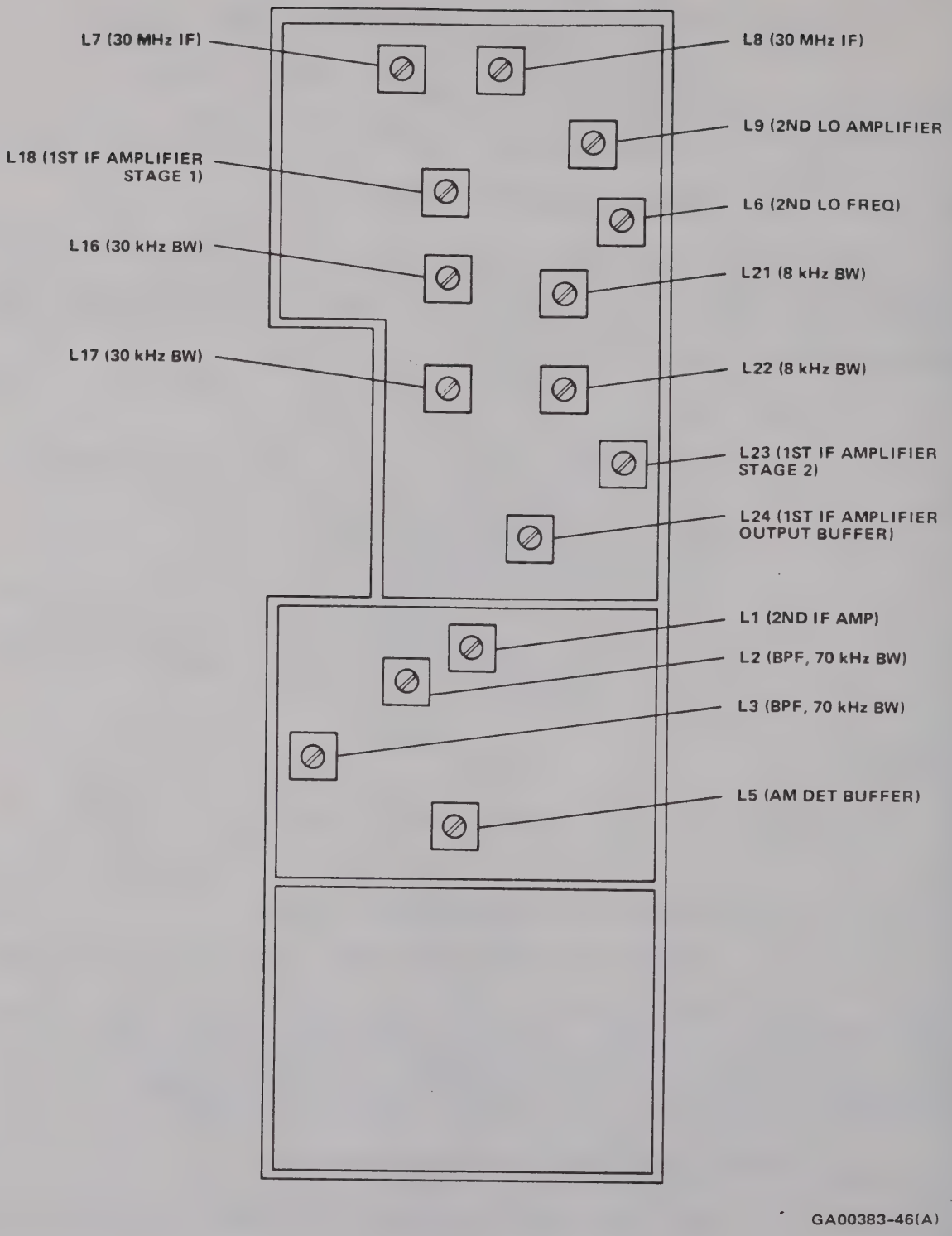

L7 (30 MHz IF)
L8 (30 MHz IF)
L9 (2ND LO AMPLIFIER
L18 (1ST IF AMPLIFIER STAGE 1)
L6 (2ND LO FREQ)
L16 (30 kHz BW)
L21 (8 kHz BW)
L17 (30 kHz BW)
L22 (8 kHz BW)
L23 (1ST IF AMPLIFIER STAGE 2)
L24 (1ST IF AMPLIFIER OUTPUT BUFFER)
L1 (2ND IF AMP)
L2 (BPF, 70 kHz BW)
L3 (BPF, 70 kHz BW)
L5 (AM DET BUFFER)
GA00383-46(A)

Figure 5-20. First and Second IF Amplifier/Detector ECA A3 Adjustment Locations (Sheet 1 of 3)

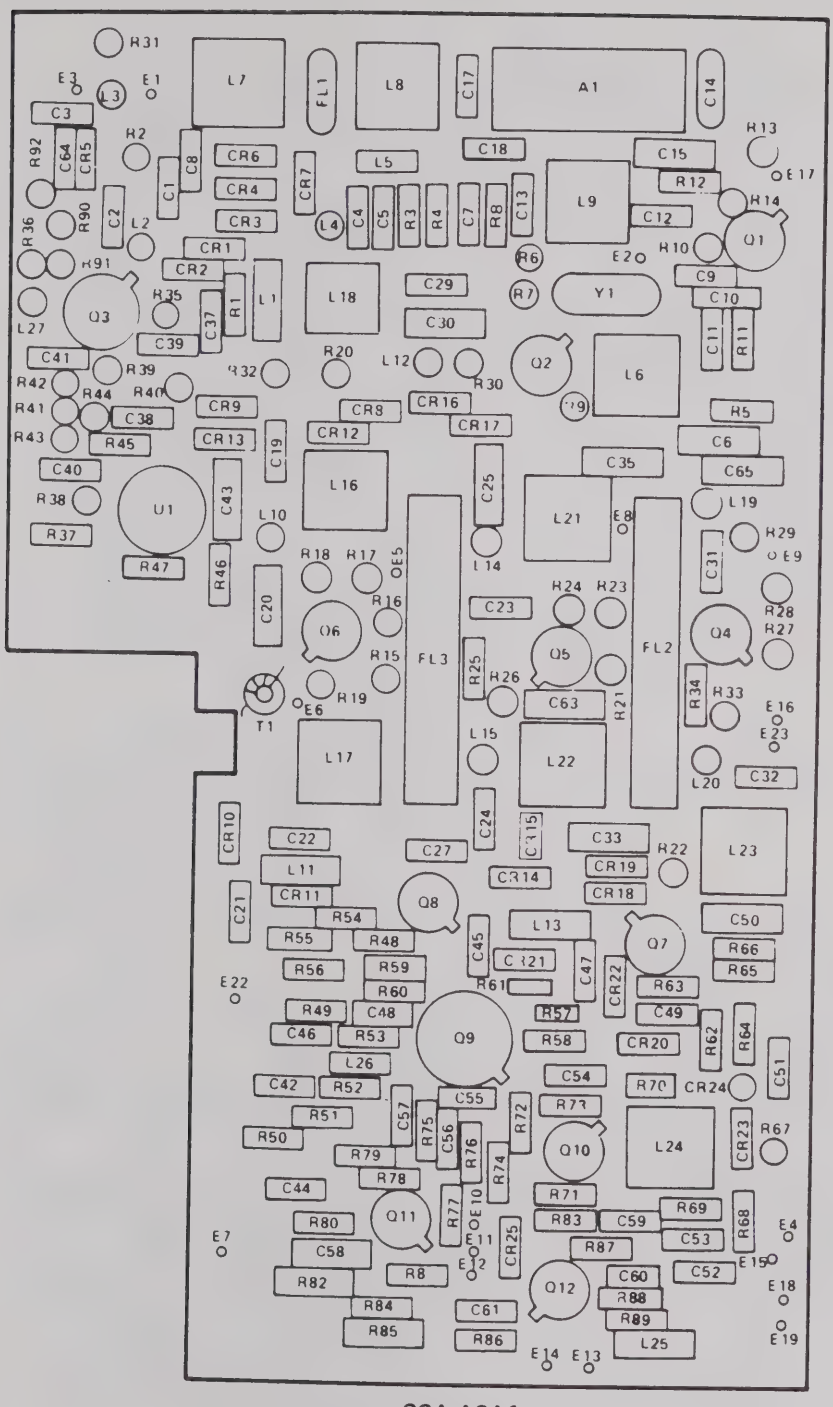


Figure 5-20. First and Second IF Amplifier/Detector ECA A3 Adjustment Locations (Sheet 2 of 3)

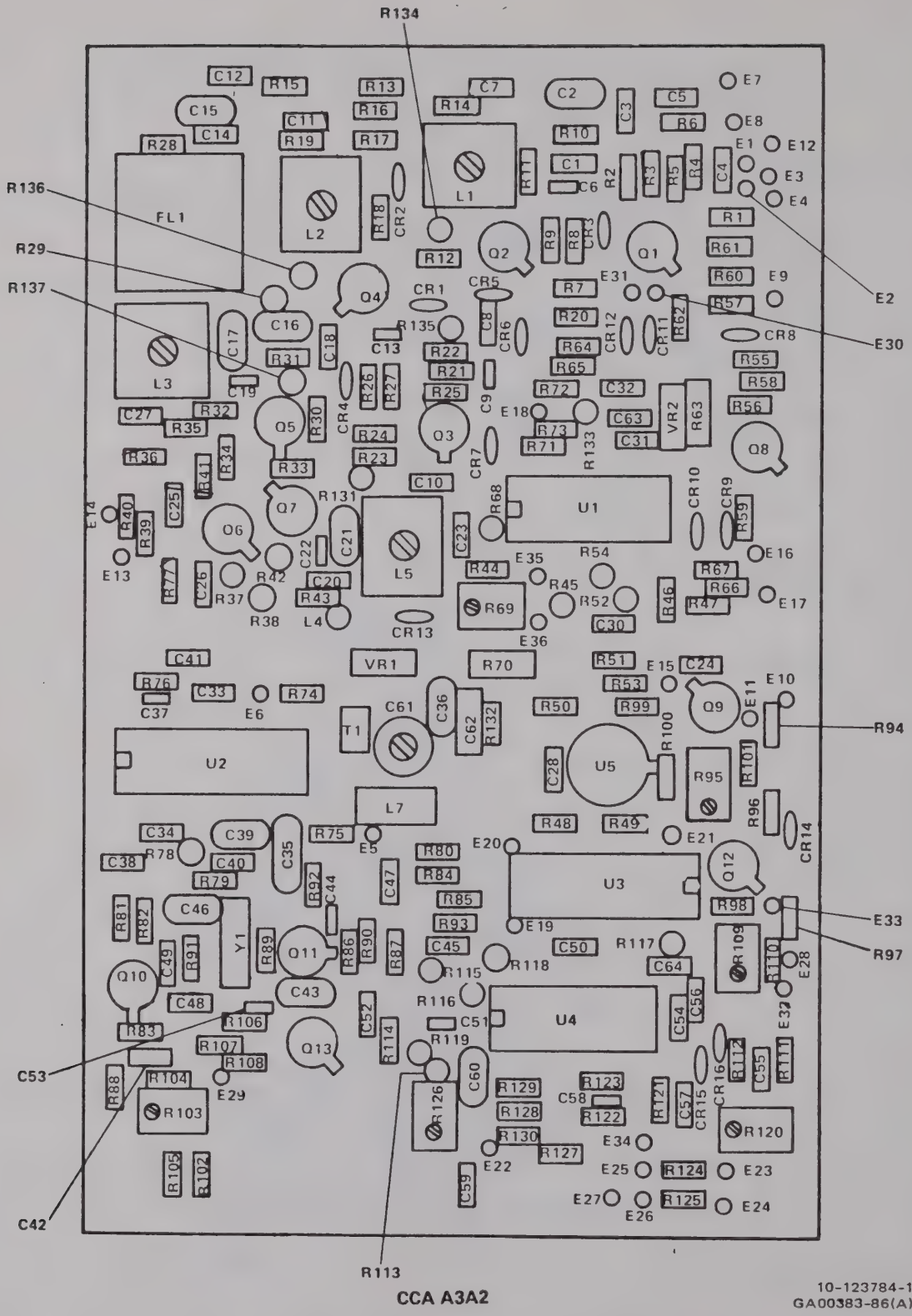


Figure 5-20. First and Second IF Amplifier/Detector ECA A3 Adjustment Locations (Sheet 3 of 3)

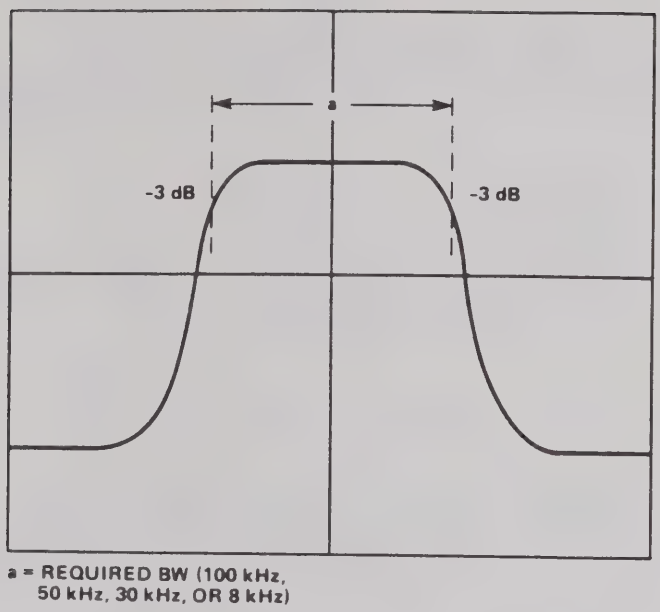


Figure 5-21. Bandpass Display Example

e. 8-kHz Bandwidth Filter Adjustment.

(1) Set Receiver Test Set IF BW toggle switches for 0,0 code.

(2) Set spectrum analyzer SCAN WIDTH control to 5 kHz.

(3) Adjust A3A1 coils L21 and L22 as required for maximum gain and 8-kHz bandpass shape displayed on the spectrum analyzer. See figure 5-21 for bandpass display example.

f. Second IF Amplifier/Detector CCA A3A2 Filter Adjustment.

(1) Move the spectrum analyzer input cable connection from ECA A3 J5 to ECA A3 J4.

(2) Set Receiver Test Set IF BW toggle switches for 1,0 code.

(3) Set the spectrum analyzer SCAN WIDTH control setting to 10 kHz.

(4) Adjust Receiver Test Set MGC toggle switches to obtain a -30 (±10) dB output signal on the spectrum analyzer.

(5) Adjust A3A2 coils L1, L2, and L3 as required for maximum gain and 50-kHz bandpass shape displayed on the spectrum analyzer. See figure 5-21 for bandpass display example.

g. AM Detector Input Filter Adjustment.

(1) Set RF signal generator controls as follows:

OUTPUT LEVEL - -80 dB
FREQUENCY - 35.000 MHz
FM modulation - OFF
AM modulation - INT
MODULATION FREQUENCY - 1 kHz (adjust level for 30 percent modulation)
RF OUTPUT - ON

(2) Set Receiver Test Set controls as follows:

Leverwheel switches A to 0, B to 3 (Band 1 or 2)
AM/FM toggle switch - Up (AM on)
IF BW toggle switches for 0,0 code (8 kHz IF BW)
ALC toggle switch - Down (ALC off)
MGC/AGC toggle switch - Up
MGC toggle switches set for maximum gain without saturation.

(3) Move input cable connector from the tracking generator output port to the RF signal generator output port so that the RF signal generator is connected to ECA A3 J1.

(4) Turn the VOLUME control knob A3R1 fully clockwise for maximum gain.

(5) Using an oscilloscope, monitor the audio output at the headset output jack A3 J3, or the DF AUDIO, AUDIO, or the WB VIDEO jacks of the Receiver Test Set.

(6) Turn the tuning slug on L5 counterclockwise until it is backed out of the coil; then slowly turn it clockwise until the first output signal peak is observed.

NOTE

On some modules it is possible to attain a second peak by continuing to turn tuning slug. The first peak, with the least coupling, is the one desired.

h. 30-MHz IF Adjustments.

NOTE

First IF amplifier/detector CCA A3A1 bottom cover must be removed to gain access to test points in this step.

(1) Set Receiver Test Set leverwheel switch C to 0.

(2) Set spectrum analyzer SCAN WIDTH to 50 kHz/div.

(3) Use RF signal generator to set spectrum analyzer to 30 MHz center frequency.

(4) Connect tracking generator output to ECA A3 J1.

(5) Using high impedance (≥10 MΩ) FET probe, observe signal at A3A1 A1-8 and adjust A3A1 coils L7 and L8 for maximum gain and 100-kHz bandpass shape. See figure 5-21 for bandpass display example.

(6) Connect counter input of RF signal generator to A3A1 Q1-G1 (R11) and adjust A3A1 coil L6 for a frequency of 19.3 (±0.0009) MHz.

(7) Connect RF signal generator RF OUTPUT to A3 J1 and set controls as follows:

Frequency - 30.000 MHz
Output level - -30 dBm
Modulation - Off

(8) With spectrum analyzer tuned to 10.7 MHz and connected to A3 J5, adjust A3A1 coil L9 for maximum gain displayed on spectrum analyzer.

(9) Repeat step (6), above, and readjust A3A1 coil L6 if necessary.

NOTE

An alternate method of adjusting the 30 MHz IF filter is to use the spectrum analyzer with the tracking generator sweeping the filter. Use the Relcom M1A mixer to up-convert the IF output frequency. See figure 5-22.

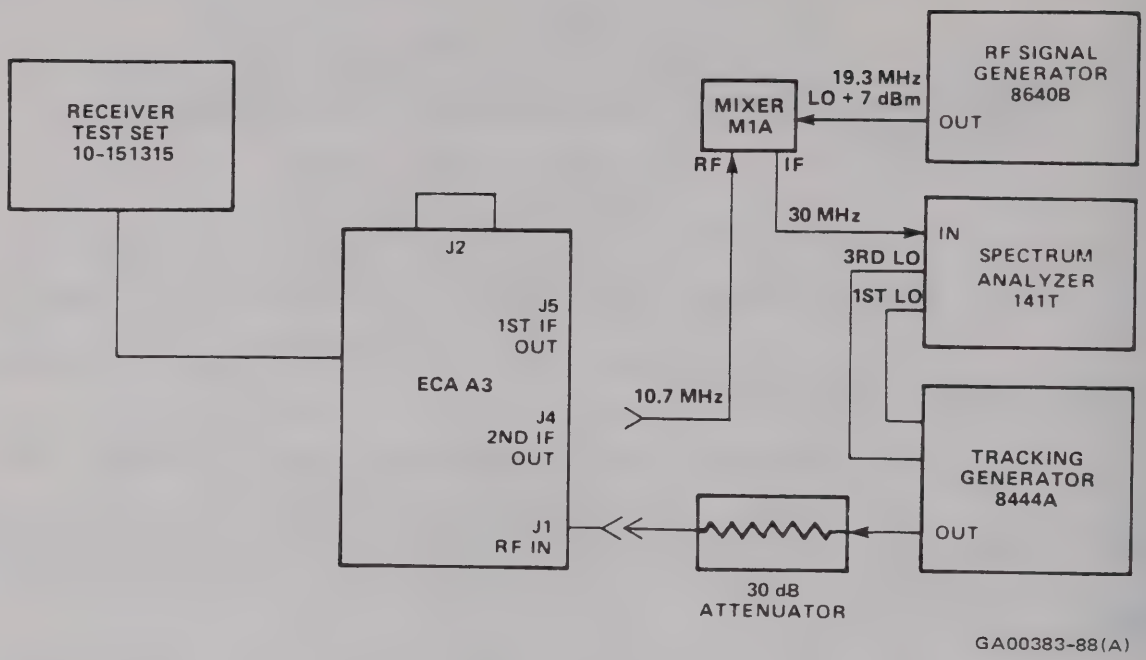


Figure 5-22. First IF Amplifier/Detector ECA A3 30-MHz BPF Adjustment Setup

NOTE

Adjustments of the FM discriminator (C61), ALC (R103 and R109), AGC offset (R69), squelch (R95), and audio outputs (R120 and R126) are performed in the receiver final adjustment procedure (see paragraph 5.7.2).

5.7.1.6 SINGLE-SIDEBAND (SSB) ADAPTER ECA A4. Adjustment of SSB adapter ECA A4 is accomplished by inductively tuning the 10.7-MHz notch filter contained on SSB CCA A4A1. All adjustments are made by adjusting center slugs in tunable coils.

a. Equipment Setup. Connect equipment as shown in figure 5-23, as follows:

(1) Connect J1 of SSB adapter ECA A4 to J4 of the test fixture.

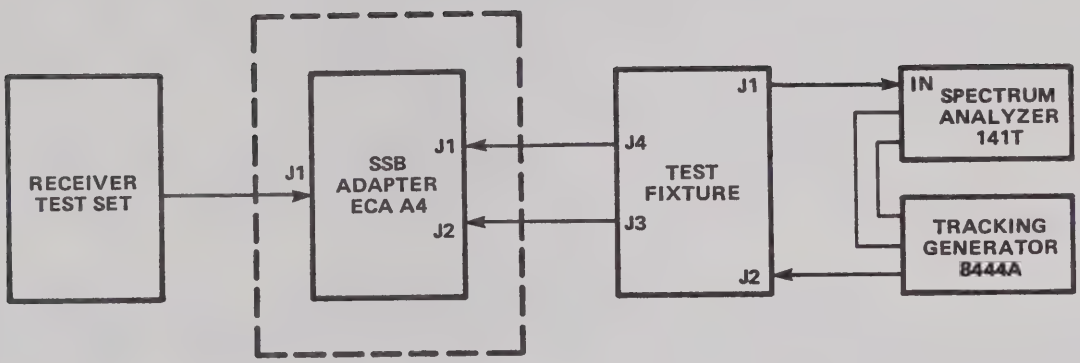


Figure 5-23. SSB ECA A4 10.7-MHz Notch Filter Adjustment Setup

NOTE

The test fixture must be fabricated locally. Refer to Appendix D for fabrication information.

(2) Connect J2 of SSB adapter ECA A4 to J3 of the test fixture.

(3) Connect J1 of the test fixture to the spectrum analyzer input port.

(4) Connect J2 of the test fixture to the tracking generator output port.

b. Equipment Control Settings. Before beginning adjustment, set equipment controls as follows:

(1) Spectrum analyzer controls:

RF section:
FREQUENCY - 10.7 MHz
BANDWIDTH - 100 kHz
SCAN WIDTH - 5 MHz

IF section:
SCAN TIME - 50 msec/div

c. Calibration of Adjustment Equipment. The tracking generator output is connected to the spectrum analyzer input port through the test cables and calibrated to establish a -10 dBm reference, which includes cable losses. Perform calibration as follows:

(1) Disconnect cables at J1 and J2 of the test fixture.

(2) Use an adapter to connect the two disconnected cable ends.

(3) Adjust tracking generator for a -10 dBm output.

(4) Reconnect the equipment setup as shown in figure 5-23.

d. 10.7-MHz Notch Filter Adjustment. The signal adjusted in this procedure is very narrow (<10 kHz wide). Use the following procedure to locate, display, and adjust the signal. See figure 5-24 for adjustment locations.

(1) With spectrum analyzer SCAN WIDTH at 5 MHz/div, the spectrum analyzer LO should be two divisions to the left of display centerline and A4A1 output should be on display centerline. Gradually decrease SCAN WIDTH setting to 2 kHz/div while adjusting FREQUENCY and FINE TUNE controls to keep A4A1 output centered on display.

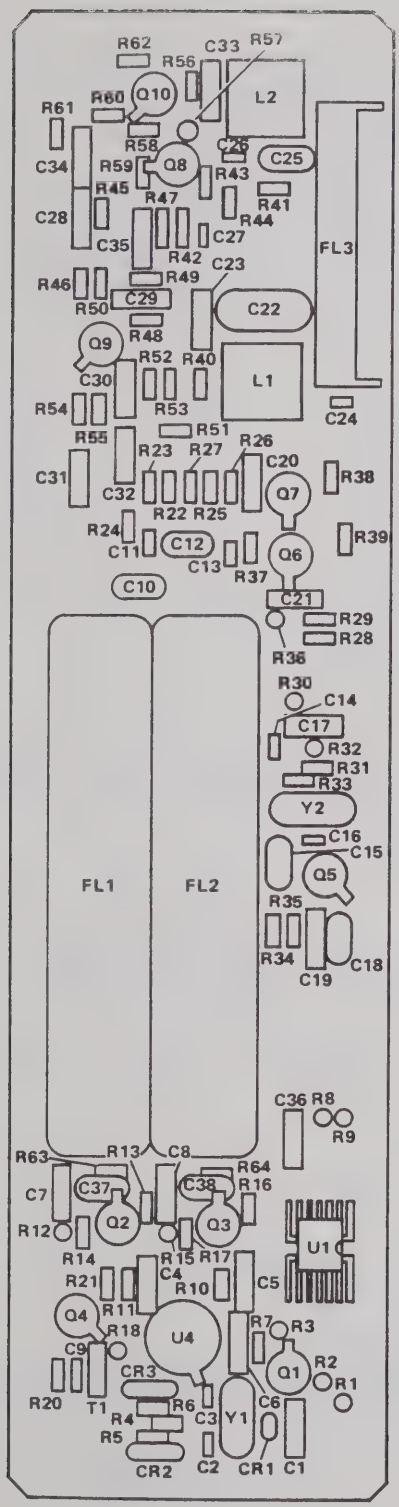
(2) With spectrum analyzer SCAN WIDTH setting at 2 kHz/div and signal centered on screen, set TUNING STABILIZER to ON position and use FINE TUNE control to recenter signal.

(3) Remove top cover of ECA A4. Do not allow feedthru pins to touch module chassis.

(4) Adjust A4A1 L1 and L2 to obtain waveform as shown in figure 5-25. The notch at 10.7 MHz must be 20 dB or more below the signal peak.

5.7.2 FINAL ADJUSTMENT AND TESTING.

Each subassembly is adjusted, as described in paragraph 5.7.1., after repair and prior to assembly. After final assembly of the R-5076/U (see paragraph 5.6.2), perform the following adjustments to achieve compatibility between individual units so that the entire unit operates properly.



10-122924-1
AB383

Figure 5-24. Receiver SSB Adapter ECA A4 Adjustment Locations

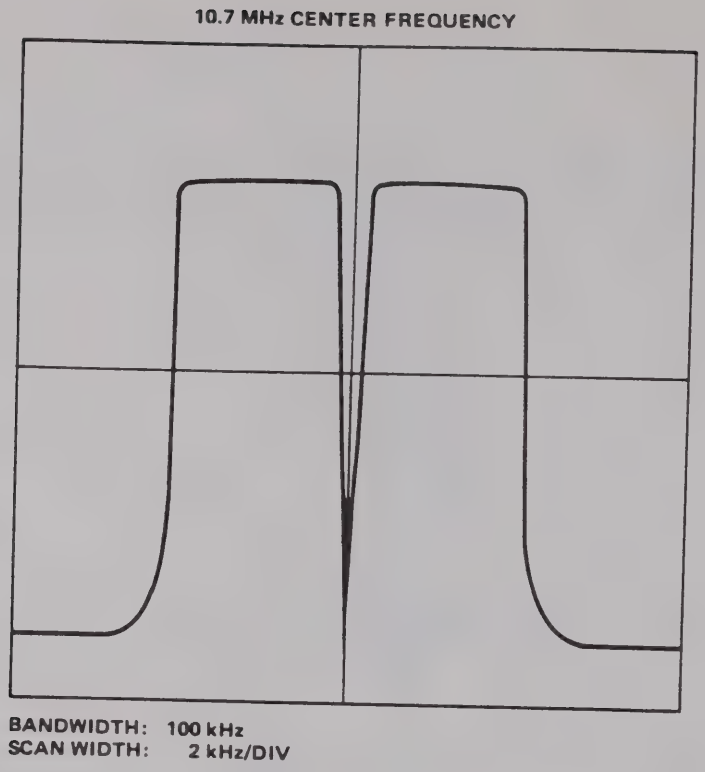


Figure 5-25. Receiver SSB Adapter CCA A4A1 10.7-MHz Notch Filter Display

CAUTION

Ensure that power is not applied to the Receiver Test Set during equipment setup.

a. Equipment Setup. Connect equipment as shown in figure 5-26 as follows:

NOTE

See figure 5-27 for component locations.

(1) Complete connections from the Receiver Test Set to the receiver under test using test set cables as shown.

(2) Connect RF signal generator RF OUT port to receiver J4 input port.

(3) Remove R-5076/U bottom cover.

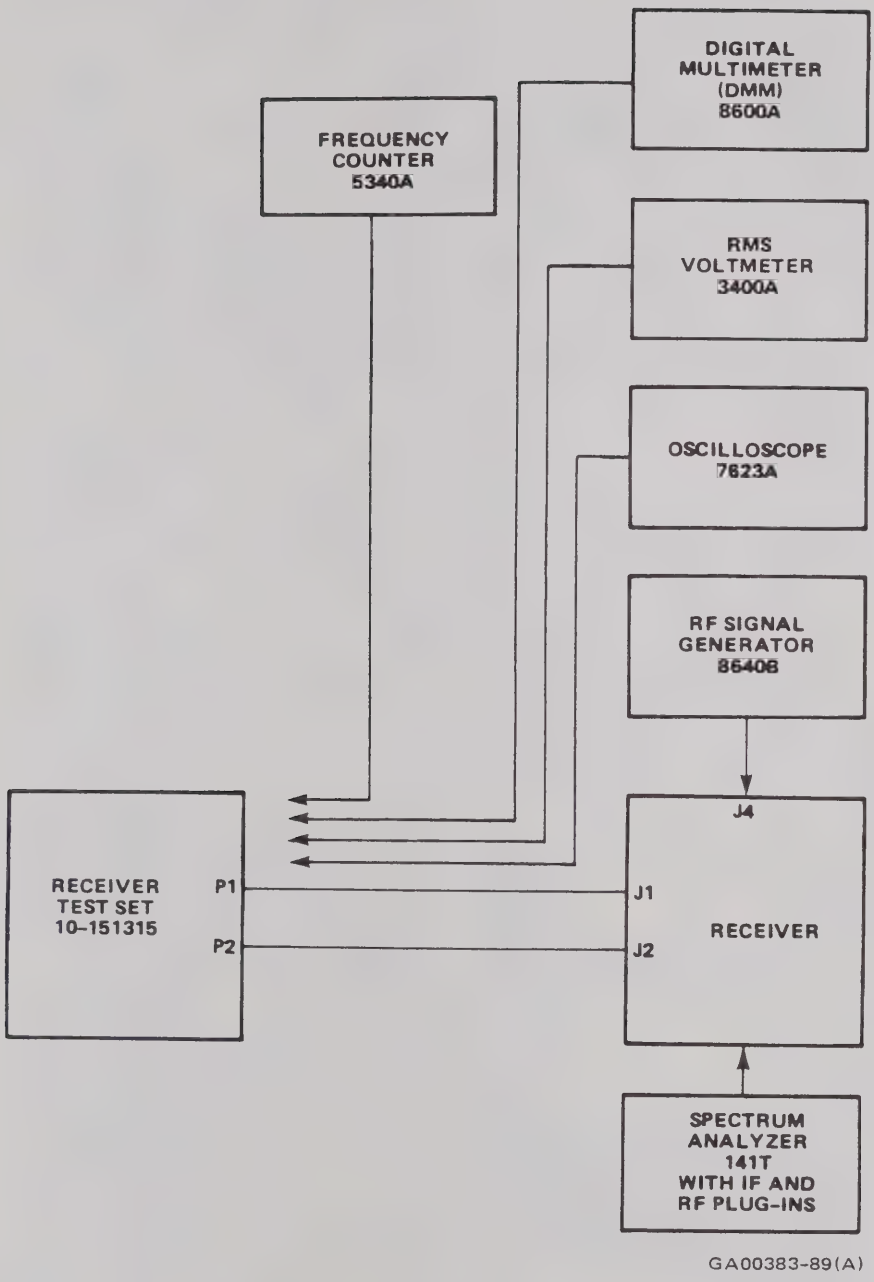


Figure 5-26. Radio Receiver R-5076/U Final Adjustment Setup

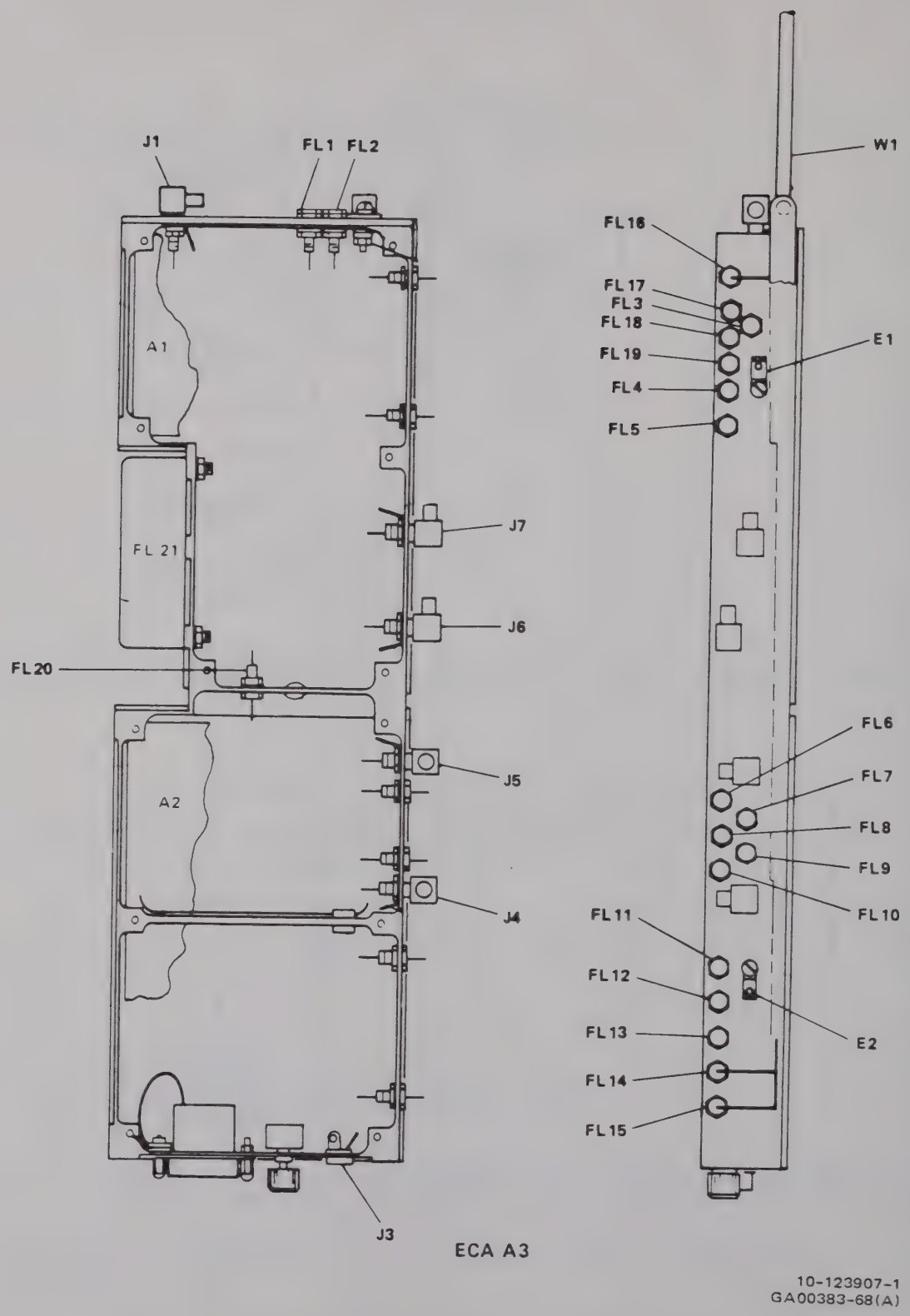


Figure 5-27. Radio Receiver R-5076/U Final Adjustment Locations (Sheet 1 of 3)

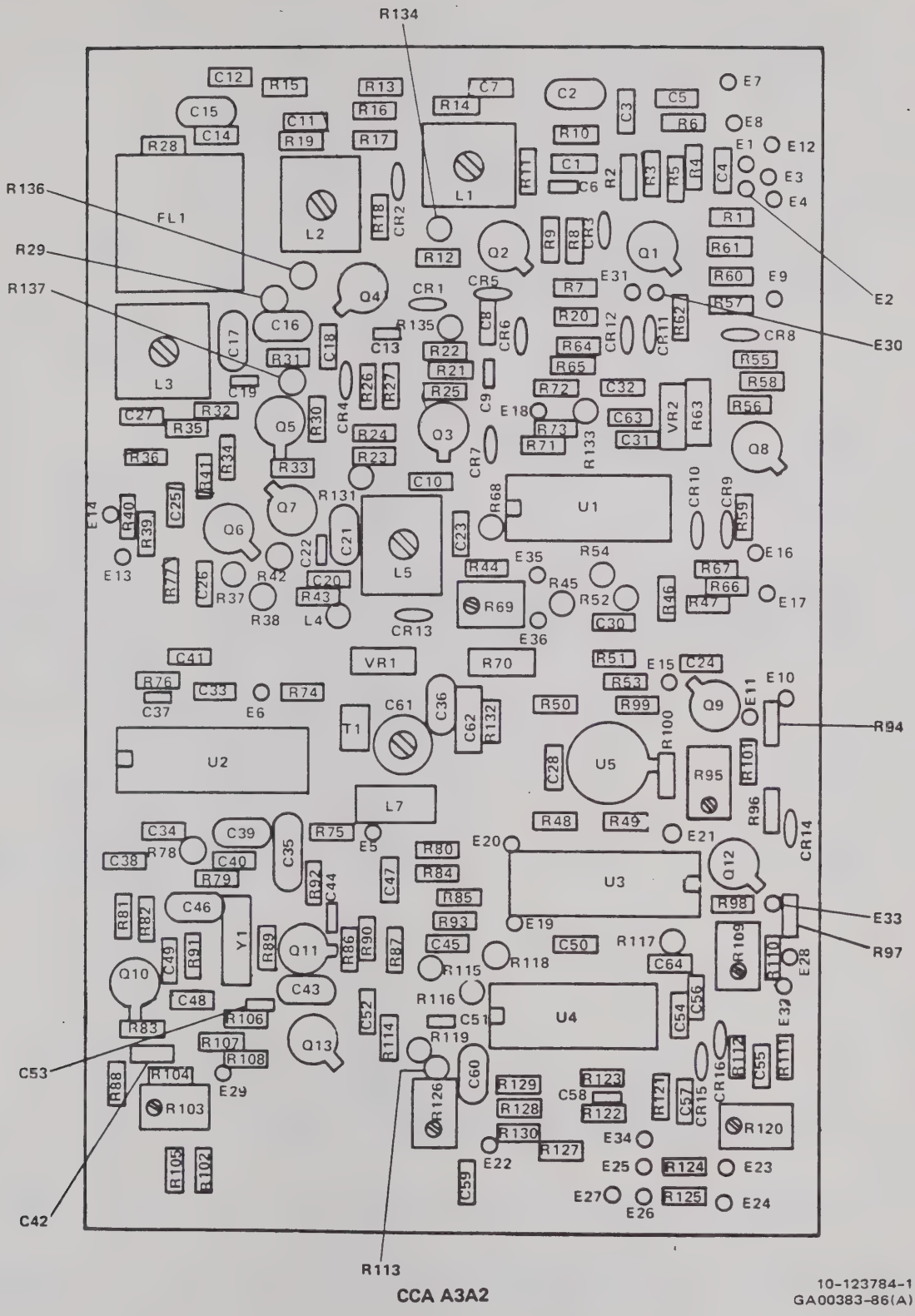


Figure 5-27. Radio Receiver R-5076/U Final Adjustment Locations (Sheet 2 of 3)

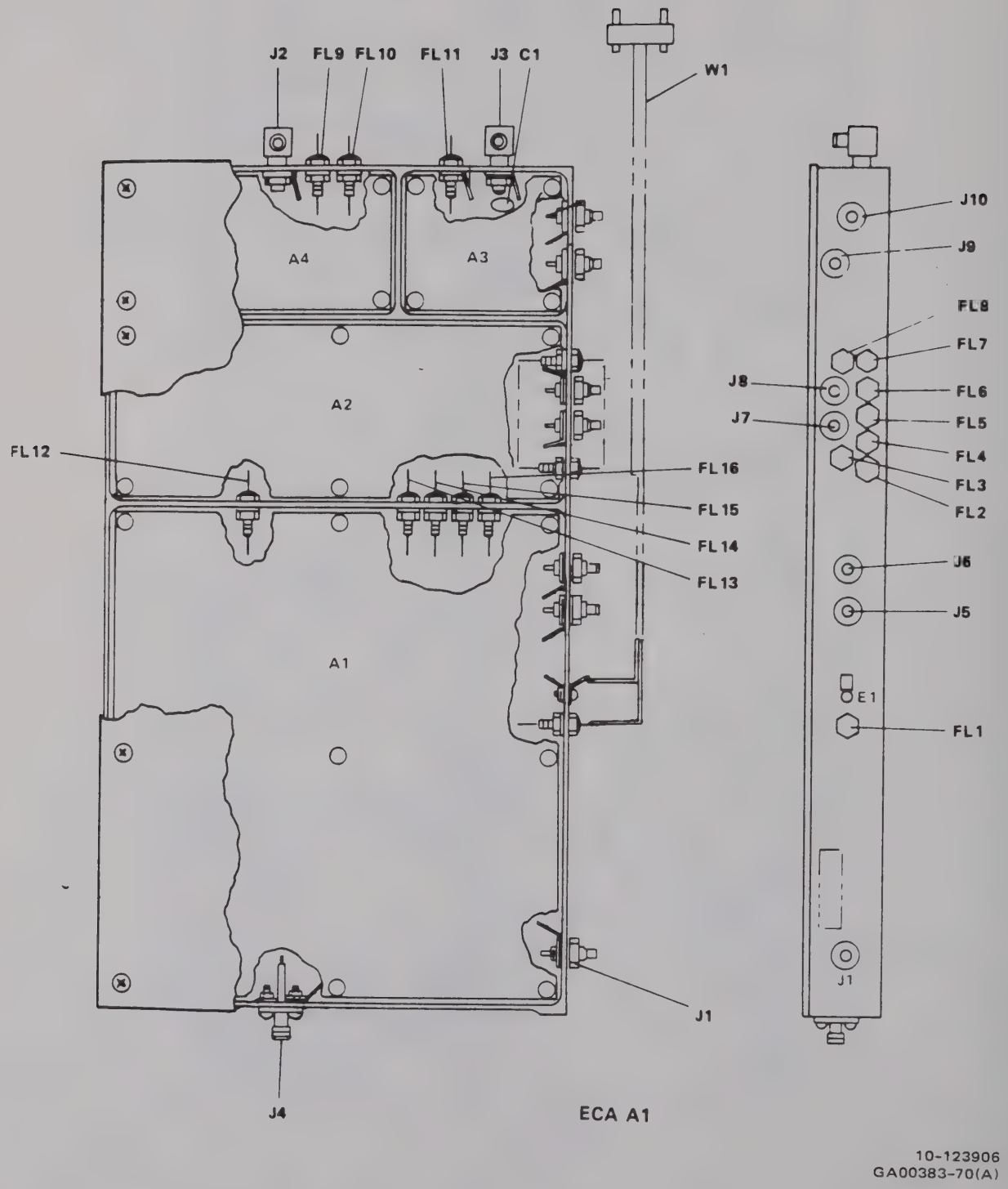


Figure 5-27. Radio Receiver R-5076/U Final Adjustment Locations (Sheet 3 of 3)

(4) Set Receiver Test Set controls as follows:

Leverwheel switches B to 3 and C to 5 (35 MHz)
MGC/AGC toggle switch - Down (AGC ON)
MGC toggle switches 1, 2, 4, 8, 16 - Down (MIN GAIN)
AM/FM toggle switch - Up (AM ON)
IF BW toggle switches for 0 code (NB IF)
Meter select switch - AGC (AGC VOLTAGE MONITOR)

(5) Set RF signal generator controls as follows:

POWER - ON
All modulation controls - OFF
FREQUENCY - 35.000 MHz
OUTPUT LEVEL - -130 dBm
RF OUT - ON
OUTPUT FREQ LEVEL vernier dial - Set to -140 dB by pressing VOLTS button (next to output meter) and adjusting for a -10 dB indication on the bottom meter scale.

(6) Set receiver AUDIO VOLUME GAIN control R1 fully clockwise (maximum) and plug headset into the receiver HEADSET jack. Ensure that no tone is audible. This check ensures that no internal signals are present that would invalidate the following adjustments.

b. Automatic Gain Control (AGC) Adjustment.

(1) Adjust CCA A3A2 R69 to obtain 0 (±10) millivolts on the Receiver Test Set SUPPLY-SIGNAL MONITOR.

(2) Change RF signal generator output level to -10 dBm and verify that the indicated output voltage is +5 (±1) V dc on the AGC voltage monitor (DPM).

c. Manual Gain Control (MGC) Adjustment.

(1) Set Receiver Test Set controls as follows:

Meter select switch to AGC (monitors IF AMPLIFIER GAIN CONTROL VOLTAGE)
MGC/AGC toggle switch - Up (MGC on)
MGC toggle switches 1, 2, 4, 8, 16 - Up (maximum gain)

(2) Check the Receiver Test Set SUPPLY-SIGNAL MONITOR for a 0 (±0.5) V dc reading. Adjust R1 of A2A2 as necessary.

(3) Set Receiver Test Set MGC toggle switches 1, 2, 4, 8, 16 to the down position and check the meter for a +5 (±1.0) V dc indication.

(4) If the correct indications are not obtained in (2) and (3), above, readjust R69 of A3A2 as required to bring the output within specified parameters, while still meeting the AGC requirements specified in step b., above.

d. 19.3-MHz Oscillator Fine Tuning.

(1) Set Receiver Test Set controls as follows:

Leverwheel switches A to 1, B to 2, and C, D, E, and F to 0 (Band 3 or 4 on)
BFO toggle switch - Up (BFO on)
IF BW toggle switches for 0,0 code (NB IF)
MGC/AGC toggle switch - Down (AGC on)
MGC toggle switches 1, 2, 4, 8, 16 - Down (minimum gain)

(2) Set RF signal generator controls as follows:

OUTPUT LEVEL - -60 dBm
All modulation controls - OFF
FREQUENCY - 120.000 MHz

(3) Connect Receiver Test Set audio output to oscilloscope input.

(4) Adjust CCA A3A1 L6 (19.3-MHz oscillator tuning coil) for a minimum signal. Check R-5076/U operation by varying the RF signal generator output frequency ±1 kHz on each side of the 120-MHz input. The audio output should rise from 0 to 1 kHz on either side of 120 MHz.

NOTE

Because of the inherent instability of the 19.3-MHz oscillator, an averaging process may be necessary to determine proper, or most desirable, setting of L6.

e. AM Detector Fine Tuning.

(1) Set signal generator controls as follows:

AM switch - INT
MODULATION FREQUENCY - 1 kHz
MODULATION 0-100% - 30%
OUTPUT LEVEL - -100 dBm

(2) Connect Receiver Test Set audio output to oscilloscope and verify that a 1-kHz output is present.

(3) Connect Receiver Test Set audio output to an RMS voltmeter (calibrated in dB) and record output level.

(4) Set Receiver Test Set MGC/AGC toggle switch to the up position. Set MGC switches to obtain the same output level recorded in step (3), above.

(5) Adjust CCA A3A2 L5 for a maximum output indication on the RMS voltmeter.

f. AGC Check. Perform this test to determine if repair of AGC circuits is required before returning the unit to service.

(1) Press Receiver Test Set MGC/AGC toggle switch to down position. Set the test set MGC switches 1, 2, 4, 8, 16 to the down position.

(2) Record the output level indicated on the RMS voltmeter.

(3) Increase RF signal generator OUTPUT LEVEL switch setting to -30 dBm.

(4) Record the level indicated on the RMS voltmeter. The difference between this level and the level recorded in step (2), above, should be 3 dB or less. If the difference is greater than 3 dB, perform AGC troubleshooting procedures.

g. FM Discriminator Fine Tuning.

(1) Set RF signal generator controls as follows:

Frequency - 35.000 MHz
Modulation - FM, 15 kHz Peak Deviation
Modulation Frequency - 1 kHz
Output Level - -60 dBm

(2) Set Receiver Test Set controls as follows:

Leverwheel switches B to 3, C to 5, and A, D, E and F to 0 (35 MHz)
AM/FM toggle switch - down (FM on)
IF BW toggle switches for 1,0 code (WB IF)
ALC switch - up (ALC on)

(3) Connect oscilloscope CH1 to WB audio output of Receiver Test Set.

(4) Increase RF signal generator - FM peak deviation until distortion occurs in the sine wave observed on the oscilloscope.

(5) If the FM discriminator is properly adjusted, the waveform distortion will appear symmetrical. If only one sine wave peak distorts (positive or negative), proceed to step (6).

(6) Adjust A3A2 C6 to obtain minimum distortion.

(7) Increase FM signal generator-FM peak deviation until distortion occurs once more.

(8) Repeat steps (6) and (7) until no improvement can be gained.

NOTE

The IF passband limits the bandwidth to 50 kHz. Therefore, as 25-kHz peak deviation is approached, distortion will occur due to the bandwidth limit. This is normal.

h. 30-MHz Filter Fine Tuning.

(1) Configure the RF signal generator to produce an 88.000 MHz unmodulated input to the receiver at -110 dBm.

(2) Set Receiver Test Set leverwheel switches B and C to 8, and A, D, E, and F to 0.

(3) Monitor the AGC voltage on the SUPPLY-SIGNAL MONITOR.

(4) Adjust CCA A3A1 L7 and L8 to obtain maximum AGC voltage output as indicated on the Receiver Test Set SUPPLY-SIGNAL MONITOR. 30 MHz filter should be swept and left alone.

i. Audio Output Adjustments.

(1) Equipment Setup. Set equipment controls as follows:

(a) RF signal generator controls:

FREQUENCY - 35.000 MHz
FM switch - INT
PEAK DEVIATION - 20 kHz (set vernier dial for a reading of 2 on the 0-3 meter scale)
MODULATION FREQUENCY - 1 kHz
OUTPUT LEVEL - -60 dB

(b) Receiver Test Set controls:

Leverwheel switches B to 3 and C to 5 MGC/AGC toggle switch - Down
AM/FM toggle switch - Down (FM on)
IF BW toggle switches for 1,0 code (WB IF)
ALC switch - Up (ALC on)

(c) Connect an RMS voltmeter to the test set WB VIDEO connector (audio out).

(2) ALC Threshold Adjustment.

NOTE

The ALC circuit is a relatively slow-acting circuit. Peak deviation changes made during the following steps must be done slowly to avoid getting false drop-point indications.

(a) Slowly rotate the RF signal generator PEAK DEVIATION vernier dial to lower the deviation. Watch the RMS voltmeter for a drop in R912B4 output. If a drop occurs before the RF signal generator meter reaches 1, adjust CCA A3A2 R109 (threshold control) to bring the output back up to the initial output level. If no drop is detected before the deviation indicator drops to 1 (10-kHz deviation), proceed with step (b), below.

(b) Set the RF signal generator PEAK DEVIATION control to 10 kHz and adjust the vernier dial for a maximum indication on the 0-10 meter scale.

(c) Slowly decrease the deviation while monitoring the RMS voltmeter for a drop indication. Adjust CCA A3A2 R109 so that signal begins to drop off when peak deviation goes below 6 kHz.

(d) Return the RF signal generator PEAK DEVIATION control to 20 kHz and set the vernier dial for a minimum (0) reading on the 0-3 scale.

(e) Slowly increase the deviation while monitoring the RMS voltmeter. The indicated output should rise rapidly as the deviation approaches 6 kHz, then slowly stabilize and maintain a steady level from 6 to 20 kHz deviation.

(3) Output Amplifier Adjustments. Both the wideband and the narrowband output amplifiers require individual adjustment to set output gain in the final stage.

(a) Set the RF signal generator output PEAK DEVIATION at 10 kHz.

(b) Connect oscilloscope to Receiver Test Set VIDEO BNC jack.

(c) Adjust CCA A3A2 R126 to obtain a 1-volt peak-to-peak, 1-kHz audio signal on the oscilloscope.

(d) Connect the oscilloscope to Receiver Test Set AUDIO BNC jack.

(e) Adjust CCA A3A2 R120 to obtain a 1-volt peak-to-peak, 1-kHz audio signal on the oscilloscope.

(4) Fixed Audio Level Adjustment. The ALC circuits are disabled and the final adjustment is made using a -60-dB input with 10-kHz deviation.

(a) Set Receiver Test Set ALC switch to the down position.

(b) Connect the oscilloscope to Receiver Test Set AUDIO BNC connector.

(c) Adjust CCA A3A2 R103 to obtain a 1-volt peak-to-peak, 1-kHz audio signal on the oscilloscope.

j. Squelch Threshold Adjustment.

NOTE

If the following adjustment cannot be satisfactorily accomplished, second IF amplifier/detector CCA A3A2 Q12 or U5 may be malfunctioning.

(1) Set RF signal generator controls as follows:

FREQUENCY - 35.000 MHz
FM switch - INT
PEAK DEVIATION - 20 kHz
PEAK DEVIATION vernier dial - 2 on 0-3 meter scale
OUTPUT LEVEL - -100 dB
OUTPUT LEVEL vernier dial - -2 on meter bottom scale

(2) Set Receiver Test Set controls as follows:

Leverwheel switches B to 3, and C to 5 MGC/AGC toggle switch - Down
AM/FM toggle switch - Down
SQLCH toggle switch - Up
IF BW toggle switches for 1,0 code

(3) Connect the oscilloscope to receiver to monitor the receiver audio output.

(4) Adjust RF signal generator OUTPUT LEVEL vernier dial to find the point at which the audio output is squelched. Adjust squelch threshold control CCA A3A2 R95 so that the signal appears at an input level of -102 dBm.

SECTION VI

PARTS LIST

6.1 GENERAL.

The repair parts list contains the major parts required to maintain the Radio Receiver R-5076/U. To ensure accurate procurement of replacement parts, the information contained in the parts list columns must be used effectively. The following paragraph describes the parts list format and includes an explanation of the information presented in each of the columns.

The REFERENCE DESIGNATOR column contains the reference designations of electrical components. The DESCRIPTION column contains the standard identifying noun or item name, followed by electrical characteristics and any other pertinent data. The number listed in the PART NUMBER column is the true manufacturer's part number. The five-digit code listed in the VENDOR CODE column identifies the actual manufacturer of the part. If replacement parts are needed, order each part number and description from the appropriate vendor. For parts ordered from ESL Incorporated, also include the reference designation and the model and serial number of the unit in which the part is to be used.

6.2 VENDOR CODES.

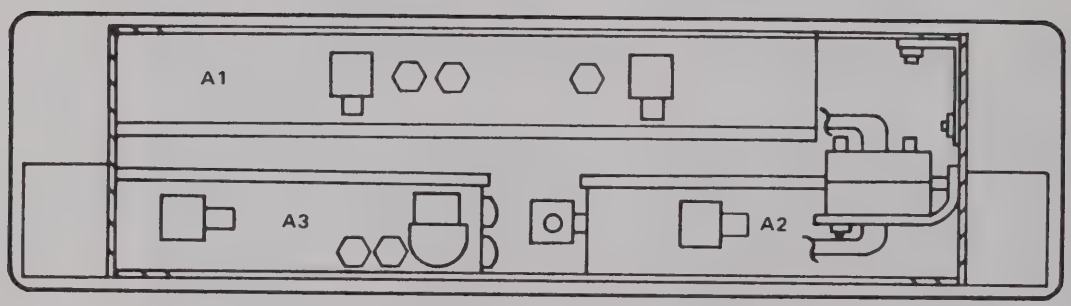
The following list of manufacturers' code designations is in accordance with the Federal Supply Code for Manufacturers, Cataloging Handbooks H4-1 and H4-2.

Vendor Code	Manufacturer
00853	Sangamo Weston Inc., Sangamo Capacitor Div., Pickens, SC 29671
01121	Allen Bradley, Milwaukee, WI 53201
01295	Texas Instruments Inc., Semiconductor Group, Dallas, TX 75265
01766	International Crystal Corp., Oklahoma City, OK 73102
04222	AVX Ceramics, Myrtle Beach, SC 29577
04713	Motorola Inc., Semiconductor Products Group, Phoenix, AZ 85008
06665	Precision Monolithics Inc. Santa Clara, CA 95050
07263	Fairchild Camera and Instrument Corp., Mountain View, CA 94042
07388	Torotel Inc., Grandview, MO 64030
07933	Raytheon Co., Mountain View, CA 94042

Vendor Code	Manufacturer
16179	Omni Spectra Corp., Merrimack, NH 03054
17856	Siliconix Inc., Santa Clara, CA 95054
18714	RCA Corp., Findley, OH 45840
18796	Erie Technological Products Inc., State College, PA 16801
18853	Electronic Crystals Corp., Kansas City, KS 66103
21912	Adams-Russell Co., Inc., Burlington, MA 01803
25120	Piezo Technology Inc., Orlando, FL 32854
26805	Omni Spectra Inc., Waltham, MA 02154
27014	National Semiconductor Corp., Santa Clara, CA 95051
28480	Hewlett-Packard Co., Palo Alto, CA 94304
28815	ESL Incorporated, Sunnyvale, CA 94086
29454	Johanson Dielectrics Inc., Burbank, CA 91505
31091	Alpha Industries, Inc., Colmar, PA 18915
31433	Kemet, Union Carbide Corp., Electronic Div., Greenville, SC 29606
32997	Bourns Inc., Trimpot Div., Riverside, CA 92507
33095	Spectrum Control Inc., Fairview, PA 16415
34335	Advanced Micro Devices, Sunnyvale, CA 94086
49956	Raytheon Co., Microwave and Power Tube Div., Waltham, MA 02154
50434	Hewlett-Packard Co., Palo Alto, CA 94304
52262	Microplex Inc., Santa Ana, CA 92705
56248	Consolidated Refining Co., Mamaroneck, NY 10543
71279	Cambridge Thermionic Corp., Cambridge, MA 02138
71468	ITT Cannon Electric DW., Santa Ana, CA 92702
72982	Erie Technological Products Inc., Erie, PA 16512
80223	TRW Inc., New York, NY 10013
81312	Winchester Electronics Division, Oakville, CT 06779
83125	Nytronics Inc., Components Div., Darlington, SC 29537
91293	Johanson Mfg. Co., Boontown, NJ 07005
98291	Sealectro Corp., Mamaroneck, NY 10544
95712	Bendix Corp., Electrical Component Div., Franklin, IN 46131

6.3 PARTS LIST.

The following pages contain a list of electrical/electronic components of the equipment. The reference designations are presented in an ascending, alphanumeric sequence. Detail components (capacitors, inductors, resistors, etc.) are also listed in alphanumeric sequence.



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GA00383-90(A)

Figure 6-1. Radio Receiver R-5076/U (Sheet 1 of 2)

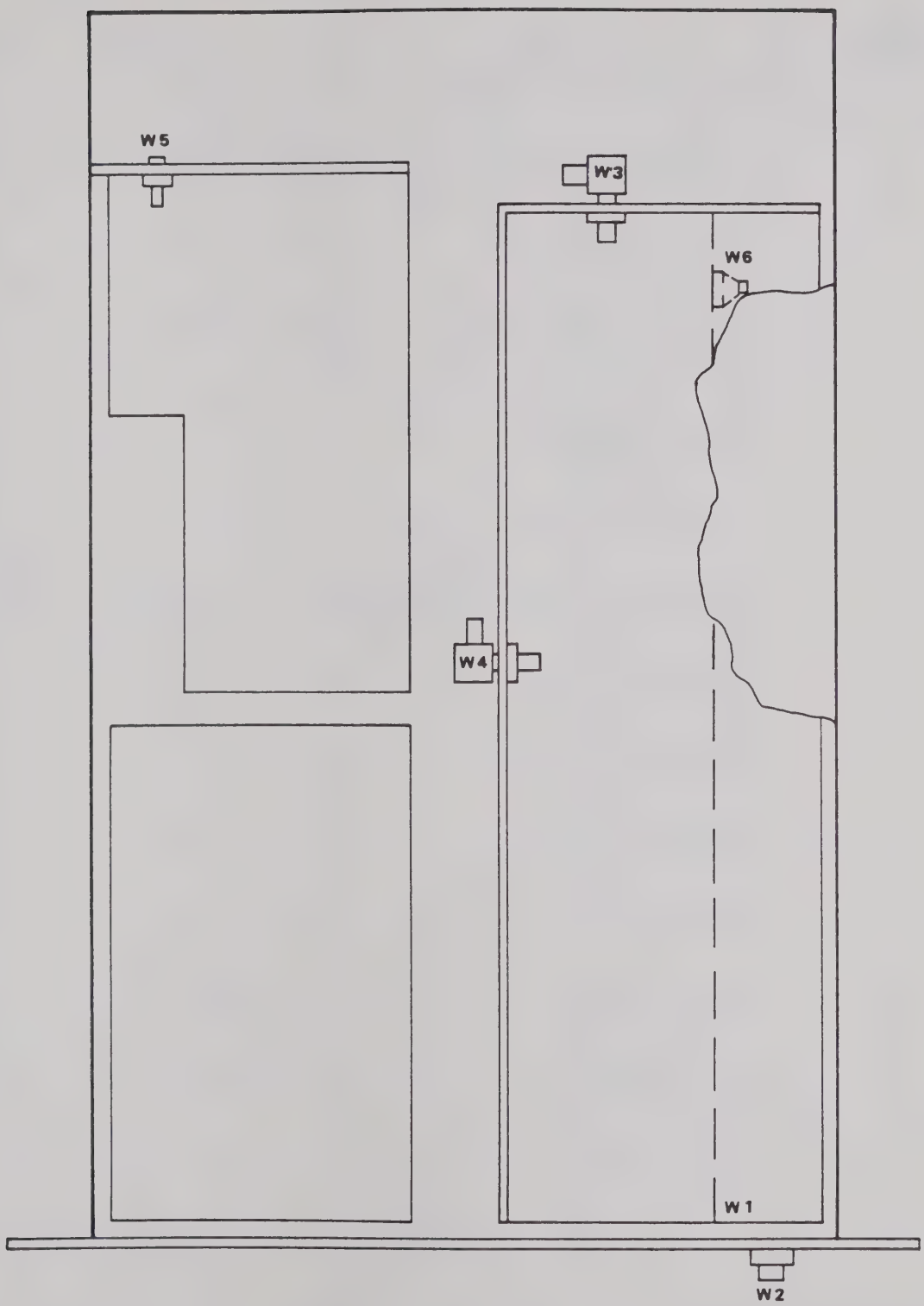


Figure 6-1. Radio Receiver R-5076/U (Sheet 2 of 2)

Table 6-1. Radio Receiver R-5076/U

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
	RADIO RECEIVER R-5076/U	10-129347	28815
A1	FRONT END ECA (SEE FIGURE 6-2)	10-123906-1	28815
A2	SYNTHESIZER ECA (SEE FIGURE 6-8)	10-118045-3	28815
A3	FIRST AND SECOND IF AMPLIFIER/DETECTOR ECA (SEE FIGURE 6-14)	10-123907-2	28815
A4	SINGLE-SIDEBAND ADAPTER ECA (SEE FIGURE 6-18)	10-122925-1	28815
W1	CABLE ASSY,RF (SEE FIGURE 6-21)	10-123940-1	28815
W2	CABLE ASSY,RF (SEE FIGURE 6-22)	10-124026-1	28815
W3	CABLE ASSY,RF (SEE FIGURE 6-23)	10-124027-2	28815
W4	CABLE ASSY,RF (SEE FIGURE 6-24)	10-124028-1	28815
W5	CABLE ASSY,RF (SEE FIGURE 6-25)	10-124029-2	28815
W6	CABLE ASSY,RF (SEE FIGURE 6-26)	10-124030-2	28815
W7	CABLE ASSY,RF (SEE FIGURE 6-27)	10-124036-1	28815
W8	CABLE ASSY,RF (SEE FIGURE 6-28)	10-124036-2	28815

ESL-1372 (3/83)

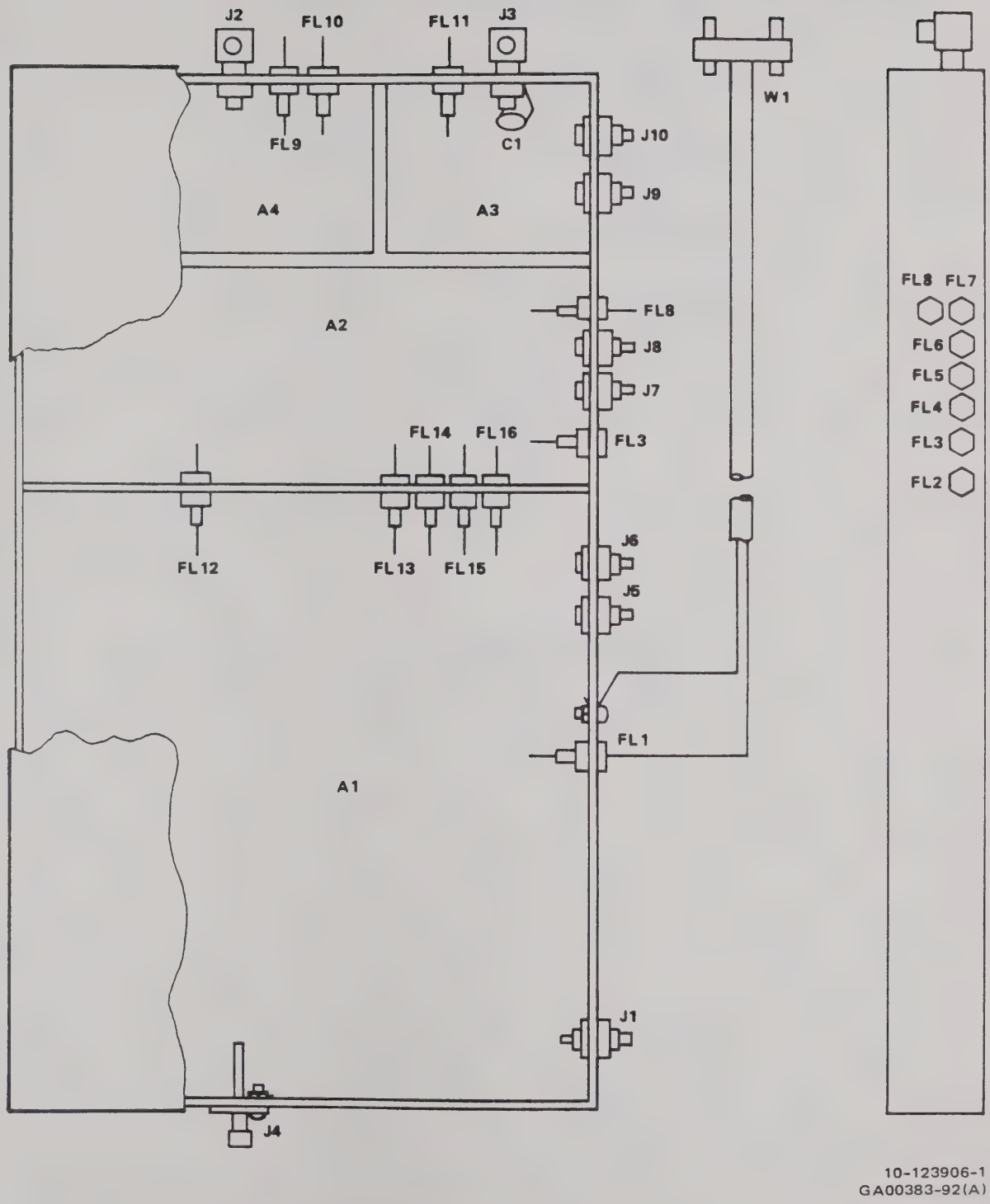
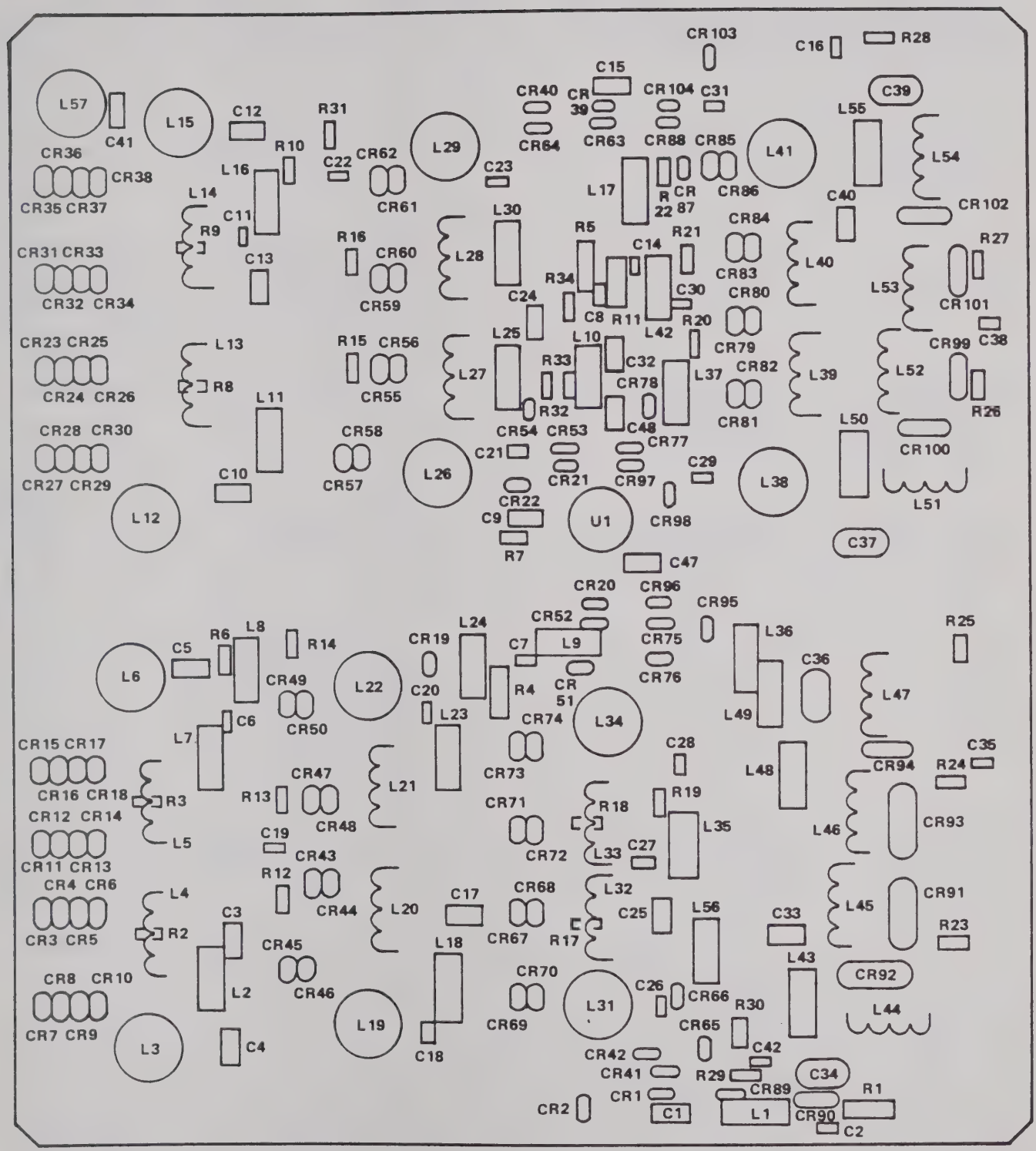


Figure 6-2. Front End ECA A1

Table 6-2. Front End ECA A1

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
A1	ELECTRONIC COMPONENT ASSY	10-123906	28815
A1	CCA,PRESELECT RF (SEE FIGURE 6-3)	10-126524-1	28815
A2	CCA,LOCAL OSCILLATOR (SEE FIGURE 6-4)	10-126534-1	22815
A3	CCA,FIRST MIXER IF (SEE FIGURE 6-5)	10-123754-1	28815
A4	CCA,TEST SOURCE (SEE FIGURE 6-6)	10-118074-2	28815
C1	CAP,FXD,MICA,82 PF,5%,50V	CMR03E820JOYP	81349
FL1-16	FILTER,RF1,10 AMP,200V, 0.022UF	51-712-003	33095
J1,5-10	CONN,RCPT,ELEC	M39012/71-0001	81349
J2,3	CONN,RCPT,ELEC	51-047-0000-220	98291
J4	CONN,RCPT,ELEC	2052-1201-00	26805
W1	CABLE ASSY,SPECIAL PURPOSE FRONT END (SEE FIGURE 6-7)	10-124328-1	28815

ESL-1372 (3/83)



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GA00383-93(A)

Figure 6-3. RF Preselect CCA A1A1

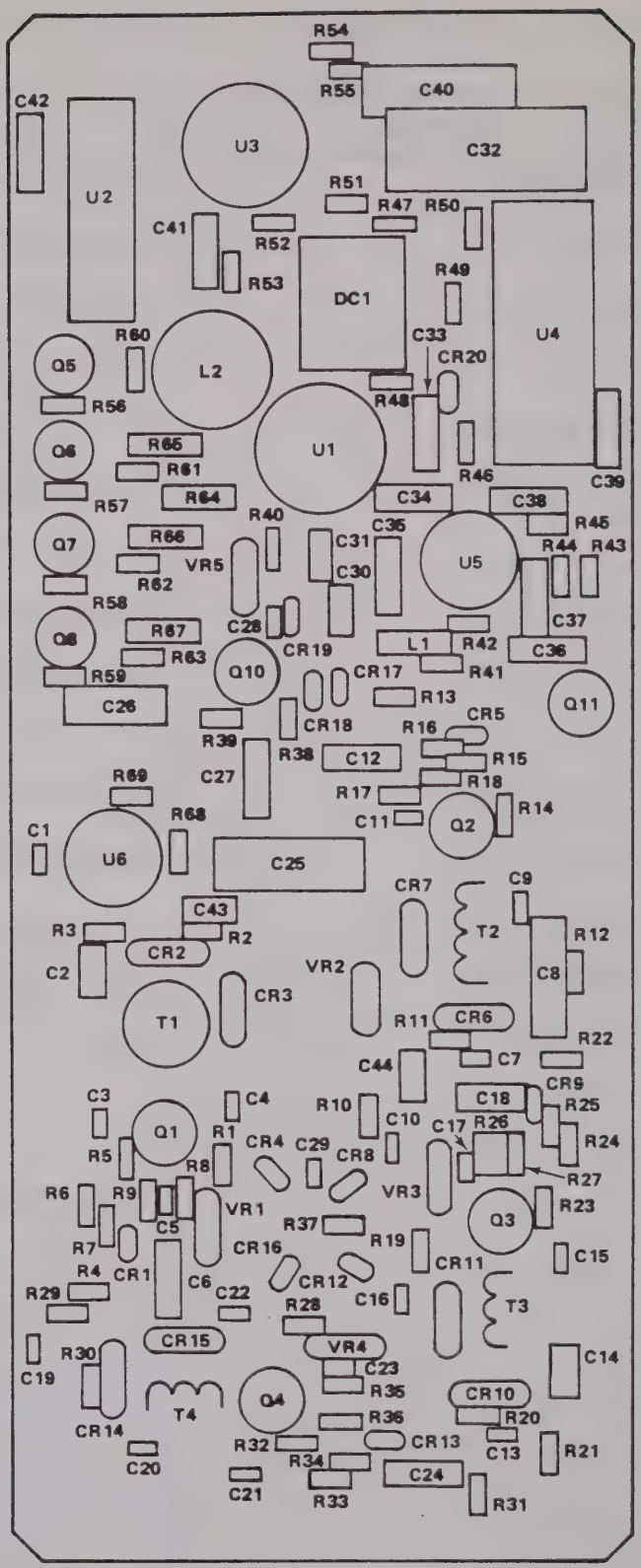
Table 6-3. RF Preselect CCA A1A1

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
C1,4,5,10,12,15, 25,32,33,40, 47,48	CAP,FXD,CER	M39014/01-1495	04222
C2,6-8,11,14,16, 18-23,26-31, 35,38,42	CAP,FXD,CER	8111-100X7R0681K	18796
C3,9,13,17,24	CAP,FXD,CER	M39014/02-1270	04222
C34,36,37,39	CAP,FXD,MICA	CMR03F111JOYP	00853
C41	CAP,FXD,CER	M39014/02-1278	04222
CR1,2,19-22,39-42,51-54,63-66,75-78,87-90,95-98,103, 104	SCND DVC,DIODE	17-123787-11	28815
CR3-18,23-38,43-50,55-62,67-74, 79-86,91-94,99-102	SCND DVC,DIODE	68-108294-1	28815
L1,2,7-11,16,17	COIL,RF,FXD	M39010/03-A390KP	83125
L3,6,12,15	COIL,RF	12-123966-1	28815
L4,13	COIL,RF	12-123959-1	28815
L5,14	COIL,RF	12-123960-1	28815
L18,23-25,30	COIL,RF,FXD	M39010/02-A100KP	83125
L19,22,26,29	COIL,RF	12-123966-2	28815
L20,27	COIL,RF	12-123959-2	28815
L21,28	COIL,RF	12-123960-2	28815
L31,34,38,41	COIL,RF	12-123966-3	28815
L32,39,46,53	COIL,RF	12-123959-3	28815
L33,40,45,52	COIL,RF	12-123960-3	28815

ESL-1372 (3/83)

Table 6-3. RF Preselect CCA A1A1 - Continued

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
L35-37,42,56	COIL,RF,FXD	M39010/02-A3R3KP	83125
L43,48-50,55	COIL,RF	M39010/02-A1R2KP	83125
L44,47,51,54	COIL,RF	12-123959-4	28815
L57	COIL,RF	D1T27	80223
R1,4,5,11	RES,FXD,CMPSN	RCR07G112JP	81349
R2,3,8,9,12,13, 15-18,20,21, 23,24,26,27	RES,FXD,CMPSN	RCR05G103JP	81349
R6,14,19,25	RES,FXD,CMPSN	RCR05G102JP	81349
R7	RES,FXD,CMPSN	RCR05G100JP	81349
R10,22,28,31	RES,FXD,CMPSN	RCR05G202JP	81349
R29	RES,FXD,CMPSN	RCR05G681JP	81349
R30	RES,FXD,CMPSN	RCR05G510JP	81349
R32,34	RES,FXD,CMPSN	RCR05G431JP	81349
R33	RES,FXD,CMPSN	RCR05G120JP	81349
U1	AMPLIFIER,RF	AH52	31091



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GA00383-94(A)

Figure 6-4. Local Oscillator CCA A1A2

Table 6-4. Local Oscillator CCA A1A2

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
C1,3-5,7,9-11,13, 15-17,19,21-23, 28,29	CAP,FXD,CER	8111-100X7R0681K	18796
C2,14	PARTS KIT	21-126767-1	28815
C6,12,18,24,27, 34-39,41,42	CAP,FXD,CER	M39014/02-1270	81349
C8	PARTS KIT	21-126768-1	28815
C20	PARTS KIT	21-126769-1	28815
C25	CAP,FXD,ELCTLT	M39003/01-2526	81349
C26	CAP,FXD,ELCTLT	M39003/01-2523	81349
C30,31	CAP,FXD,CER	M39014/01-1495	81349
C32	CAP,FXD,ELCTLT	M39003/01-2535	81349
C33	CAP,FXD,CER	M39014/01-1497	81349
C40	CAP,FXD,ELCTLT	M39003/01-2608	81349
C43,44	CAP,FXD,MICA	CMR03C4R0D0CP	81349
CR1,5,9,13	SCND DVC,DIODE	JANTX1N4148	81349
CR2,3,6,7,10,11	SCND DVC,DIODE	68-108294-1	28815
CR4,8,12,16	SCND DVC,DIODE	17-123787-11	28815
CR14,15	SCND DVC,DIODE	68-108295-1	28815
CR17,18,19	SCND DVC,DIODE	17-123787-10	28815
CR20	SCND DVC,DIODE	JANTX1N5711	81349
DC1	COUPLER,BI-DIR	CH-134	21912
L1	COIL,RF	MS75084-4	83125
L2	COIL,RF	M03-17	07388
Q1-4	TRANSISTOR	17-123787-23	28815

Table 6-4. Local Oscillator CCA A1A2 - Continued

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
Q5-8,10	TRANSISTOR	JANTX2N2907A	81349
Q11	TRANSISTOR	JANTX2N2222A	81349
R1,10,19,28	RES,FXD,CMPSN	RCR05G102JP	81349
R2-4,9,11-13,18, 20-22,27,29-31, 36,45,46,56-59	RES,FXD,CMPSN	RCR05G103JP	81349
R5-7,14-16,23-25,32-34	RES,FXD,CMPSN	RCR05G104JP	81349
R8,17,26,35,68	RES,FXD,CMPSN	RCR05G101JP	81349
R37,64-67	RES,FXD,CMPSN	RCR05G222JP	81349
R38	RES,FXD,CMPSN	RCR05G332JP	81349
R39	RES,FXD,CMPSN	RCR05G681JP	81349
R40	RES,FXD,CMPSN	RCR05G333JP	81349
R41	RES,FXD,CMPSN	RCR05G472JP	81349
R42	RES,FXD,CMPSN	RCR05G105JP	81349
R43	RES,FXD,CMPSN	RCR05G622JP	81349
R44	RES,FXD,CMPSN	RCR05G331JP	81349
R47	RES,FXD,CMPSN	RCR05G510JP	81349
R48,50	PARTS KIT	21-129557-1	28815
R49	PARTS KIT	21-129558-1	28815
R51,53	PARTS KIT	21-129559-1	28815
R52	PARTS KIT	21-129560-1	28815
R54	RES,FXD,CMPSN	RCR05G511JP	81349
R55	RES,FXD,CMPSN	RCR05G560JP	81349
R60-63	RES,FXD,CMPSN	RCR05G682JP	81349
R69	RES,FXD,CMPSN	RCR05G431JP	81349

ESL-1372 (3/83)

Table 6-4. Local Oscillator CCA A1A2 - Continued

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
T1	TRANSFORMER,RF	12-126687-1	28815
T2	TRANSFORMER,RF	12-126688-4	28815
T3	TRANSFORMER,RF	12-126688-2	28815
T4	TRANSFORMER,RF	12-126688-3	28815
U1,3	AMPLIFIER,RF	AH52	31091
U2	MICROCKT,DGTL	M38510/01004BEB	81349
U4	AMPLIFIER,RF	AM-101	21912
U5	MICROCKT,DGTL	M38510/10101BGC	81349
U6	MICROCKT,LIN	LM120H-5.0/883B	27014
VR1-5	SCND DVC,DIODE	JANTX1N758A	81349

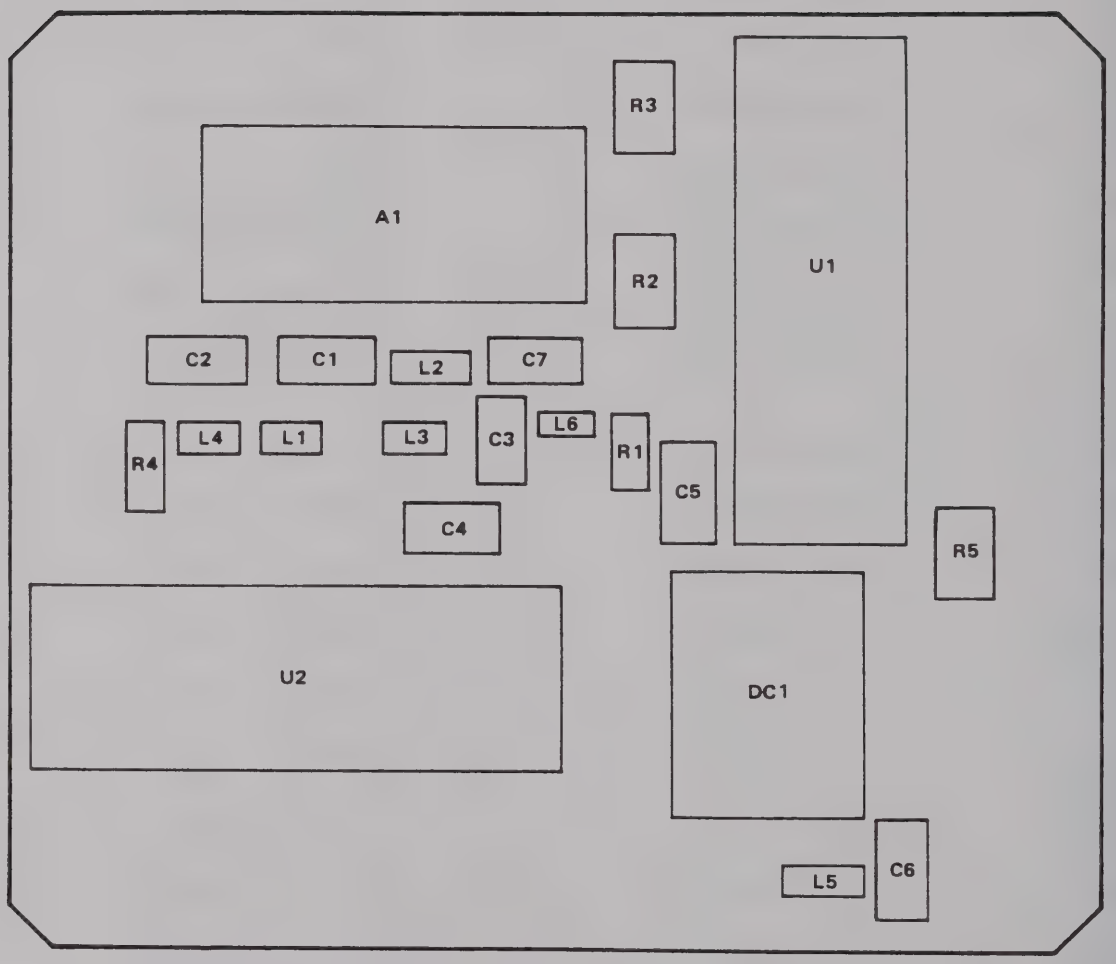


Figure 6-5. First Mixer IF CCA A1A3

Table 6-5. First Mixer IF CCA A1A3

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
A1	MIXER,DOUBLE-BALANCED	MD-138	21912
C1,2,4	CAP,FXD,MICA	CMR03E560JOYP	81349
C3	CAP,FXD,MICA	CMR03F151JOYP	81349
C5	CAP,FXD,CER	M39014/02-1258	81349
C6	CAP,FXD,MICA	CMR03E820JOYP	81349
C7	CAP,FXD,MICA	CMR03C150DOAP	81349
DC1	COUPLER,BI-DIR	CH-134	21912
L1	COIL,RF	12-124466-1	28815
L2	COIL,RF	12-124466-2	28815
L3	COIL,RF	12-124466-3	28815
L4	COIL,RF	12-124466-4	28815
L5	COIL,RF	12-124466-5	28815
L6	COIL,RF	12-124466-6	28815
R1,3	RES,FXD,CMPSN	RCR05G181JP	81349
R2	RES,FXD,CMPSN	RCR05G300JP	81349
R4,5	RES,FXD,CMPSN	RCR05G510JP	81349
U1,2	AMPLIFIER,RF	AM-101	21912

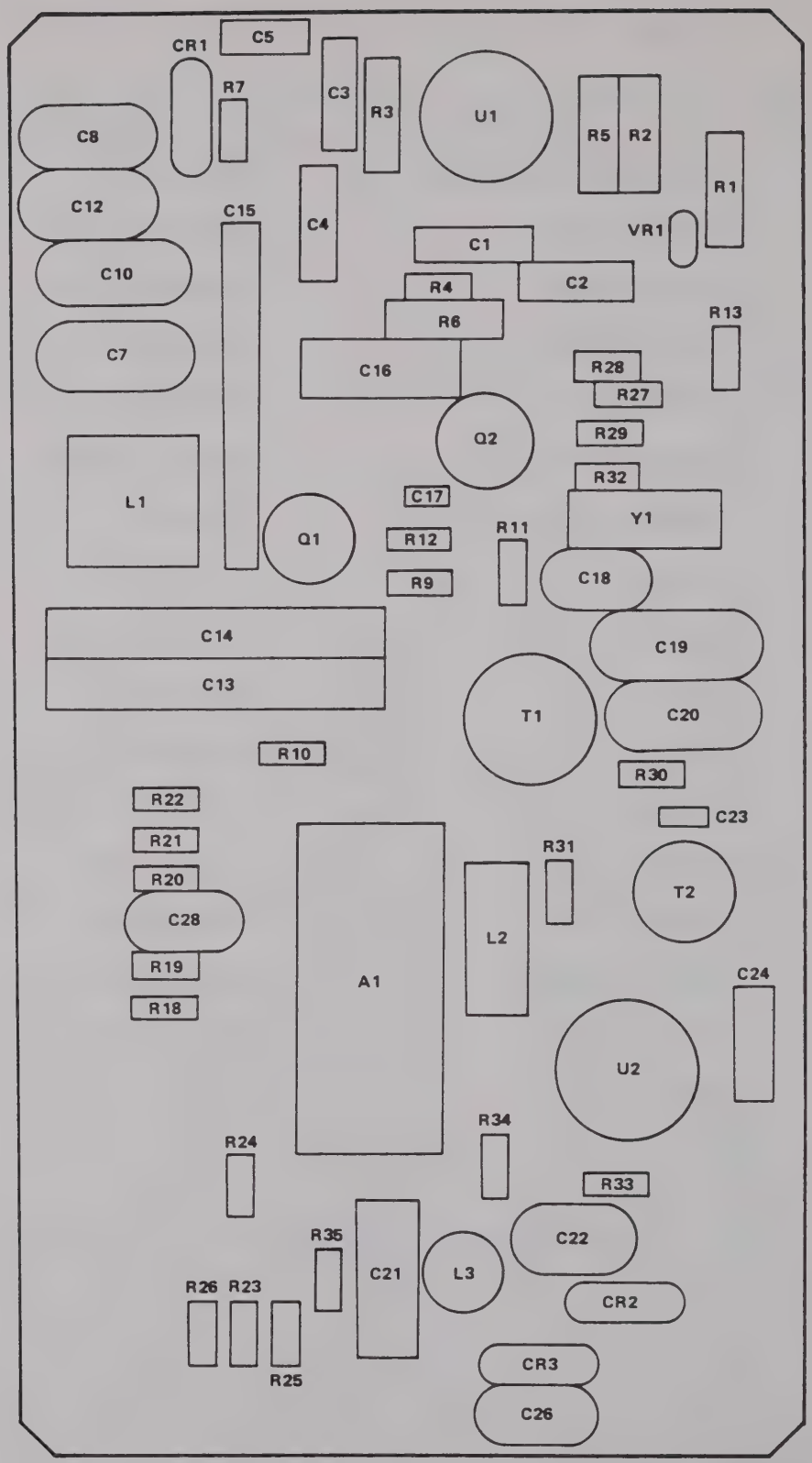


Figure 6-6. Test Source CCA A1A4

Table 6-6. Test Source CCA A1A4

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
A1	MIXER,DOUBLE-BA	MD-108	21912
C1-3	CAP,FXD,CER	M39014/02-1270	81349
C4,5	CAP,FXD,CER	M39014/01-1495	81349
C7	CAP,FXD,CER	CCR06CG431JP	81349
C8	PARTS KIT	21-130059-1	28815
C10	CAP,FXD,CER	CCR065G122JP	81349
C12	PARTS KIT	21-130060-1	28815
C13	CAP,FXD,PLSTC	CFR04RSA103GP	81349
C14,15	CAP,FXD,PLSTC	CFR04RSA472GP	81349
C16,21	CAP,FXD,ELCTLT	M39003/01-2523	81349
C17,23	CAP,FXD,CER	8111-100X7R0681K	18796
C18	CAP,FXD,MICA	CMR03F910JOYP	81349
C19	CAP,FXD,MICA	CMR05F241JODP	81349
C20	CAP,FXD,MICA	CMR05F271JODP	81349
C22	CAP,FXD,MICA	CMR03C150DOAP	81349
C24	CAP,FXD,CER	M39014/01-1277	81349
C26	CAP,FXD,MICA	CMR03F111JOYP	81349
C28	CAP,FXD,MICA	CMR03C3RODOCP	81349
CR1	SCND DVC,DIODE	68-108294-1	28815
CR2	SCND DVC,DIODE	JANTX1N5711	81349
CR3	SCND DVC,DIODE	TX-0112	28480
L1	COIL,RF	558-7107-29	71279
L2	COIL,RF	M39010/02-AIROKP	83125
L3	COIL,RF	12-118056-1	28815

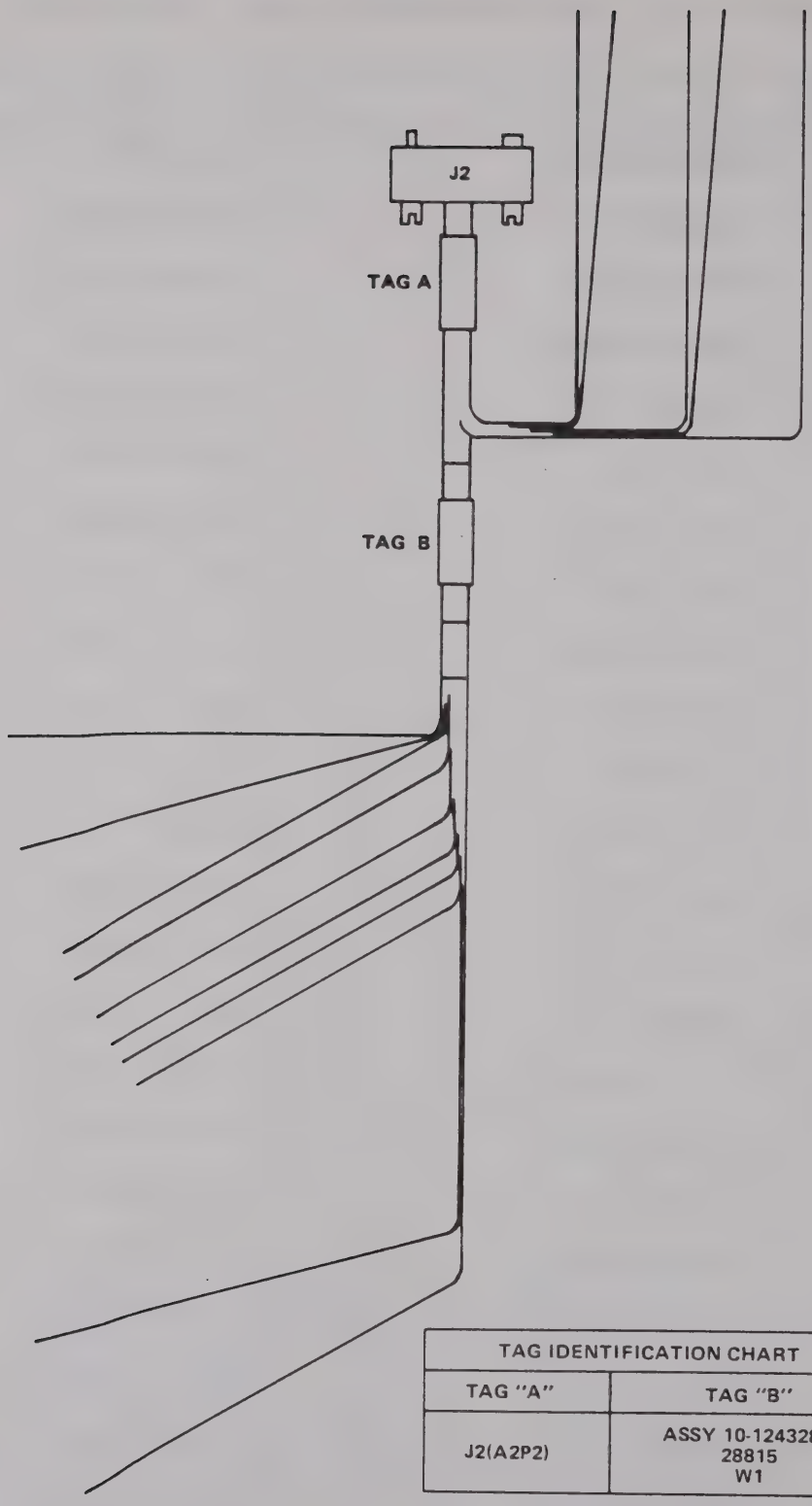
Table 6-6. Test Source CCA A1A4 - Continued

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
Q1,2	TRANSITOR	JANTX2N3251A	81349
R1	RES,FXD,CMPSN	RCR07G821JP	81349
R2,3	RES,FXD,FILM	RNR55C1501FP	81349
R4	RES,FXD,CMPSN	RCR05G470JP	81349
R5	RES,FXD,FILM	RNR55C3322FP	81349
R6	RES,FXD,FILM	RNR55C1502FP	81349
R7	RES,FXD,CMPSN	RCR05G153JP	81349
R9	RES,FXD,CMPSN	RCR05G333JP	81349
R10	RES,FXD,CMPSN	RCR05G473JP	81349
R11	RES,FXD,CMPSN	RCR05G821JP	81349
R12	RES,FXD,CMPSN	RCR05G102JP	81349
R13,35	RES,FXD,CMPSN	RCR05G100JP	81349
R18,22	RES,FXD,CMPSN	RCR05G680JP	81349
R19	RES,FXD,CMPSN	RCR05G241JP	81349
R20	RES,FXD,CMPSN	RCR05G330JP	81349
R21,24,26	RES,FXD,CMPSN	RCR05G151JP	81349
R23	RES,FXD,CMPSN	RCR05G360JP	81349
R25	RES,FXD,CMPSN	RCR05G510JP	81349
R27,30	RES,FXD,CMPSN	RCR05G332JP	81349
R28	RES,FXD,CMPSN	RCR05G682JP	81349
R29,34	RES,FXD,CMPSN	RCR05G511JP	81349
R31,33	RES,FXD,CMPSN	RCR05G222JP	81349
R32	RES,FXD,CMPSN	RCR05G271JP	81349
T1	TRANSFORMER,RF	12-123967-4	28815

Table 6-6. Test Source CCA A1A4 - Continued

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
T2	TRANSFORMER,RF	12-123969-1	28815
U1	MICROCKT,DGTL	M38510/10101BGC	81349
U2	MICROCKT,LIN	CA3028B/3	18714
VR1	SCND DVC,DIODE	JANTX1N752A	81349
Y1	XTAL UNIT,QTZ	CR-67A/U20.000000 MHz	81349

ESL-1372 (3/83)



TAG IDENTIFICATION CHART	
TAG "A"	TAG "B"
J2(A2P2)	ASSY 10-124328-1 28815 W1

10-124328-1
GA00383-97(A)

Figure 6-7. Special Purpose Front End Cable Assembly A1W1

Table 6-7. Special Purpose Front End Cable Assembly A1W1

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
J2	CONN,PLUG,ELEC	SLE14PJTU	81312

ESL-1372 (3/83)

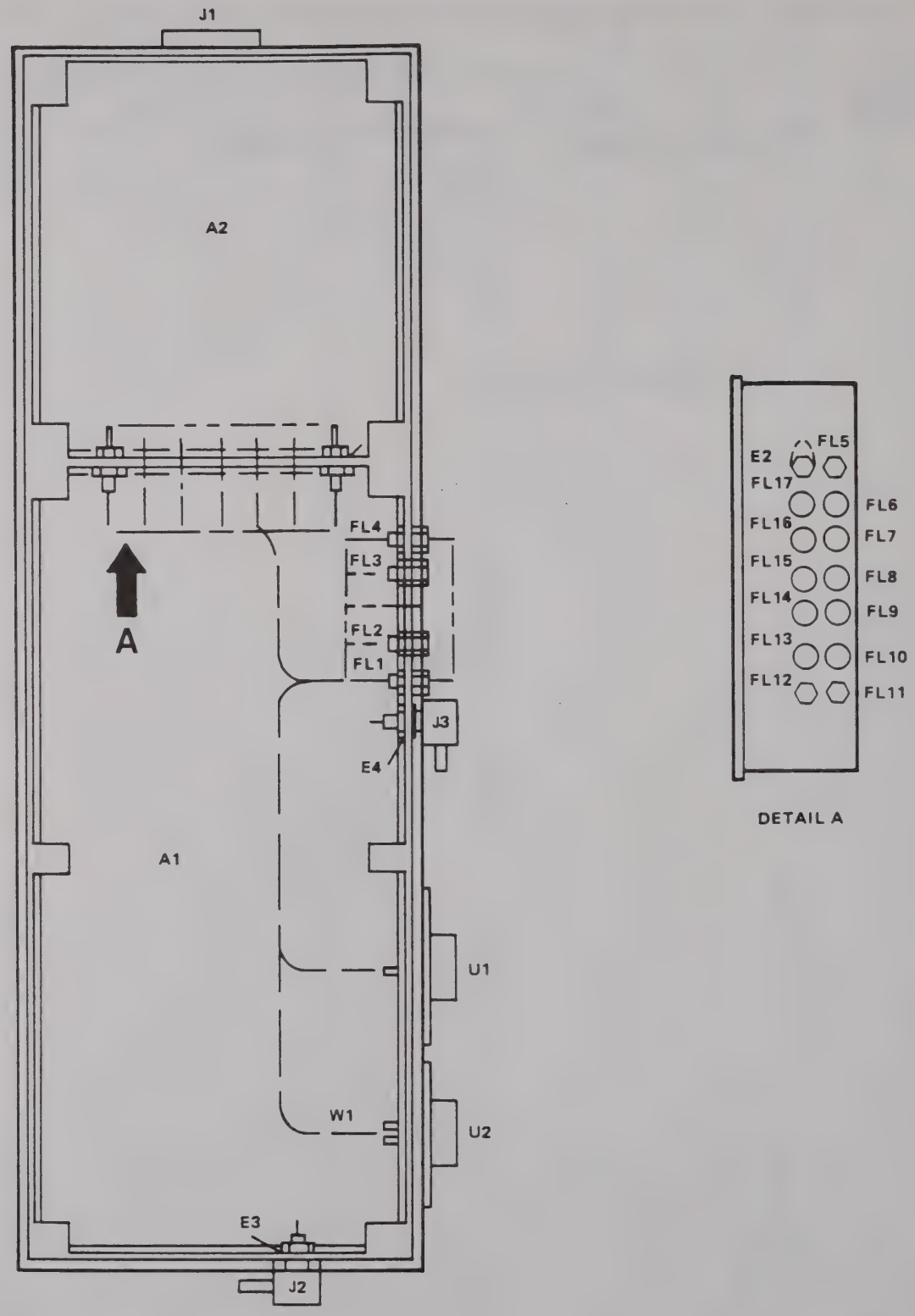
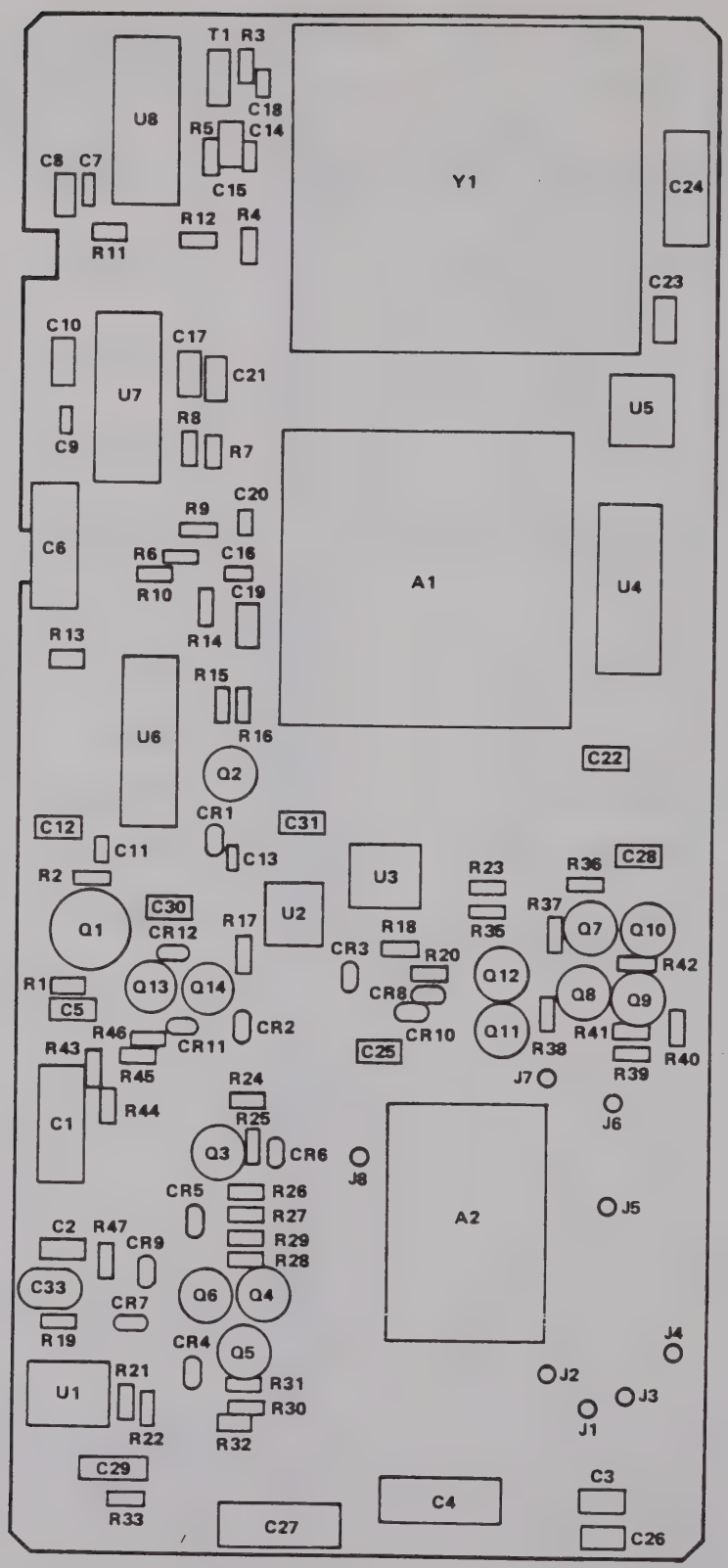


Figure 6-8. Synthesizer ECA A2

Table 6-8. Synthesizer ECA A2

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
A2	ELECTRONIC COMPONENT ASSY, SYNTHESIZER	10-118045-3	28815
A1	CCA,SYNTHESIZER (SEE FIGURE 6-9)	10-122485-1	28815
A2	CCA,DECODER (SEE FIGURE 6-11)	10-123764-1	28815
E3,4	TERMINAL LUG	MS77068-4	96096
FL1-6,8-17	FILTER,RFI,10 AMP,200V, 0.022UF	51-712-003	33095
FL7	FILTER,RFI	1250-003	72982
J1	CONN,RCPT,ELEC	2DA31S	71468
J2,3	CONN,RCPT,ELEC	2DA31S	71468
U1	MICROCKT,DGTL	UA7805KMQB	07263
U2	MICROCKT,LINEAR	UA7812KMQB	07263
W1	CABLE ASSY, SP (SEE FIGURE 6-13)	10-124329-1	28815



10-122484-2
GA00383-99(A)

Figure 6-9. Synthesizer CCA A2A1

Table 6-9. Synthesizer CCA A2A1

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
A1	SUBSTRATE ASSY	10-001414-3	28815
A2	CCA,LOOP AMPLIFIER (SEE FIGURE 6-10)	10-123644-1	28815
C1,6,24	CAP,FXD,ELCTLT	M39003/01-2499	81349
C2,3,22,23,25, 26,30	CAP,FXD,CER	M39014/02-1270	81349
C4,27	CAP,FXD,ELCTLT	M39003/01-2526	81349
C5,8,10,12,15,17, 19,21,28,31	CAP,FXD,CER	M39014/01-1495	81349
C7,9,11,13,14,16 18,20	CAP,FXD,CER	8111-100X7R0681K	18796
C29	CAP,FXD,CER	M39014/02-1411	04222
C33	CAP,FXD,MICA	CMR03E620JOYP	00853
CR1-10	SCND DVC,DIODE	JANTX1N4148	81349
CR11,12	SCND DVC,DIODE	JANTX1N5711	81349
J1-8	JACK,TIP	450-3388-01-03	71279
Q1	TRANSISTOR	JANTX2N2905A	81349
Q2	TRANSISTOR	JANTX2N4957	81349
Q3,4,8,9	TRANSISTOR	JANTX2N2222A	81349
Q5,6,11,12	TRANSITOR	JANTX2N2907A	81349
Q7,10	TRANSISTOR (2N5396)	17-123787-3	28815
Q13,14	TRANSISTOR	JANTX2N2432A	81349
R1,22	RES,FXD,CMPSN	RCR05G561JP	81349
R2	RES,FXD,CMPSN	RCR05G471JP	81349
R3,5	RES,FXD,CMPSN	RCR05G510JP	81349
R4,9,15	RES,FXD,CMPSN	RCR05G101JP	81349

Table 6-9. Synthesizer CCA A2A1 - Continued

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
R6,7,19,20,21,26	RES,FXD,CMPSN	RCR05G102JP	81349
R8,10,13,14	RES,FXD,CMPSN	RCR05G511JP	81349
R11,16	RES,FXD,CMPSN	RCR05G241JP	81349
R12	RES,FXD,CMPSN	RCR05G271JP	81349
R17,18,43-46	RES,FXD,CMPSN	RCR05G681JP	81349
R23	RES,FXD,CMPSN	RCR05G391JP	81349
R24,27	RES,FXD,CMPSN	RCR05G303JP	81349
R25	RES,FXD,CMPSN	RCR05G392JP	81349
R28,30	RES,FXD,CMPSN	RCR05G911JP	81349
R29,31,32	RES,FXD,CMPSN	RCR05G182JP	81349
R33,36,47	RES,FXD,CMPSN	RCR05G103JP	81349
R35	RES,FXD,CMPSN	RCR05G223JP	81349
R37,42	RES,FXD,CMPSN	RCR05G224JP	81349
R38,41	RES,FXD,CMPSN	RCR05G104JP	81349
R39,40	RES,FXD,CMPSN	RCR05G473JP	81349
T1	TRANSFORMER,RF	12-124060-1	28815
U1	MICROCKT,DGTL (54123)	M38510/01203BFB	81349
U2	MICROCKT,DGTL (4344)	MC38510/4344BABS	81349
U3	MICROCKT,DGTL (5404)	M38510/00105BDB	81349
U4	MICROCKT,DGTL	09-115697-1	28815
U5	MICROCKT,DGTL (5490A)	5490FMQB	07263
U6	MICROCKT,DGTL	MC10537BEBS	04713
U7	MICROCKT,DGTL	SP8640AB	56248

ESL-1372 (3/83)

Table 6-9. Synthesizer CCA A2A1 - Continued

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
U8	MICROCKT,DGTL (1692)	1692/BEBJC	04713
Y1	OSCILLATOR,XTAL	16-123620-1	28815

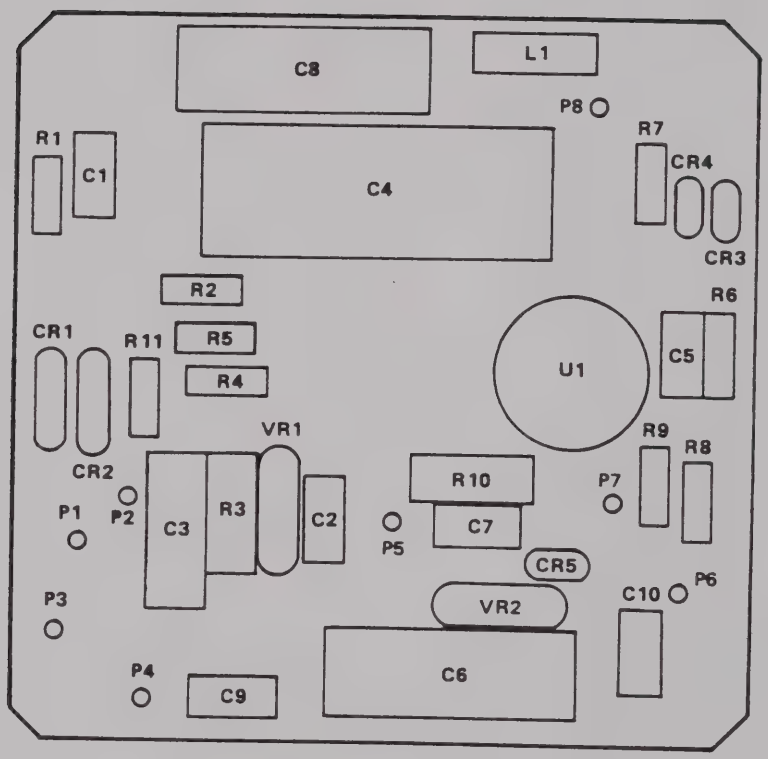
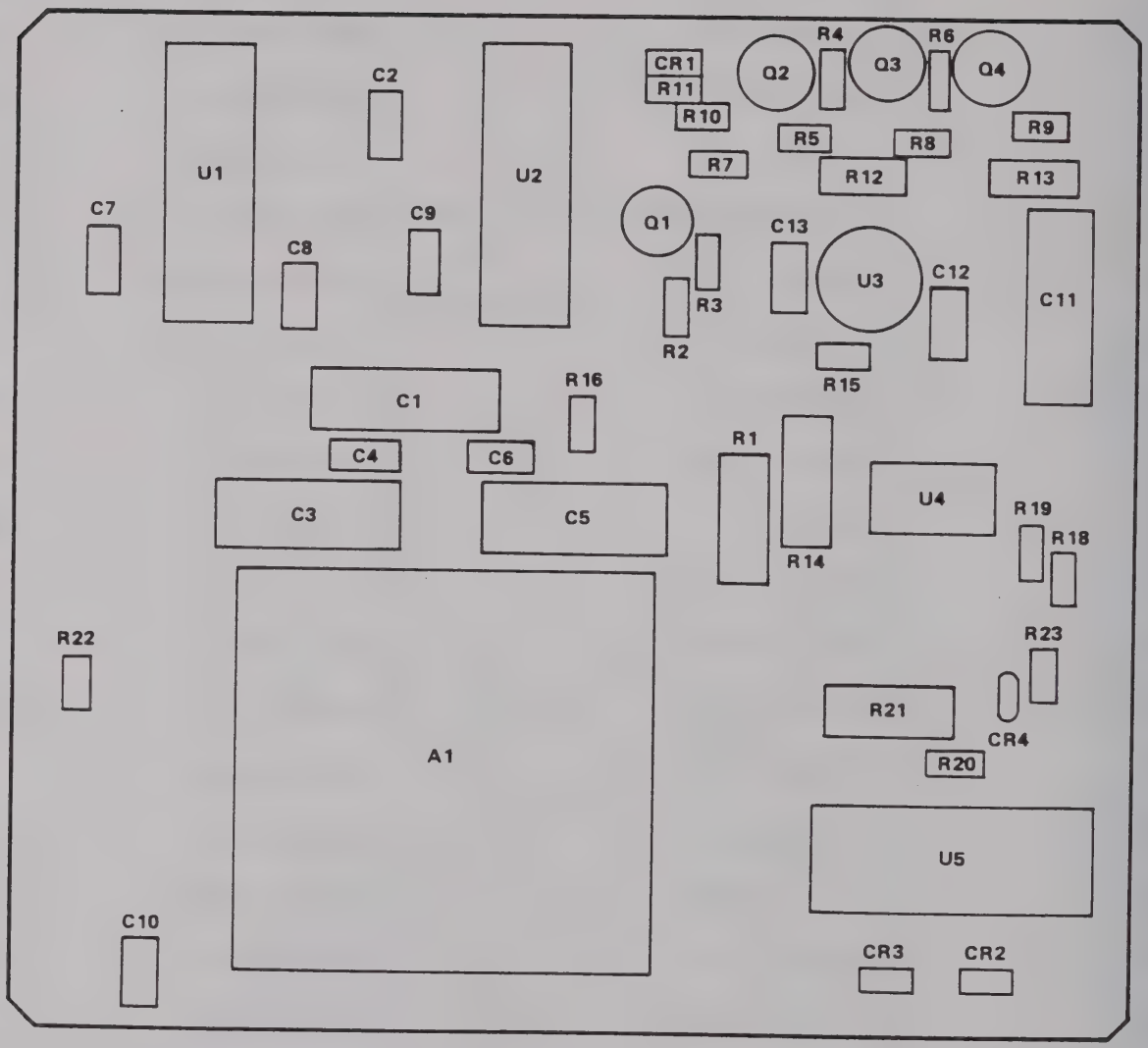


Figure 6-10. Loop Amplifier CCA A2A1A2

Table 6-10. Loop Amplifier CCA A2A1A2

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
C1	CAP,FXD,CER	M39014/01-1495	81349
C2,5,7,9	CAP,FXD,CER	M39014/02-1270	81349
C3	CAP,FXD,ELCTLT	M39003/01-2523	81349
C4	CAP,FXD,PLSTC	CFR05ARA155JM	81349
C6	CAP,FXD,ELCTLT	M39003/01-2499	81349
C8	CAP,FXD,ELCTLT	M39003/01-2608	81349
C10	CAP,FXD,CER	M39014/02-1278	81349
CR1,2	SCND DVC,DIODE	17-123787-12	28815
CR3-5	SCND DVC,DIODE	JANTX1N4148	81349
L1	COIL,RF	MS75085-19	96096
P1-8	CONN,PLUG,ELEC	460-2970-02-03	71279
R1,2,8	RES,FXD,CMPSN	RCR05G100JP	81349
R3,10	RES,FXD,CMPSN	RCR07G102JP	81349
R4	RES,FXD,CMPSN	RCR05G224JP	81349
R5	RES,FXD,CMPSN	RCR05G154JP	81349
R6,7	RES,FXD,CMPSN	RCR05G103JP	81349
R9	RES,FXD,CMPSN	RCR05G102JP	81349
R11	RES,FXD,CMPSN	RCR05G474JP	81349
U1	MICROCKT,DGTL	LH0022H/883B	27014
VR1	SCND DVC,DIODE	JANTX1N751A	81349
VR2	SCND DVC,DIODE	JANTX1N748A	81349



10-123764-1
GA00383-101(A)

Figure 6-11. Decoder CCA A2A2

Table 6-11. Decoder CCA A2A2

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
A1	SUBSTRATE ASSY (CAM-02) (SEE FIGURE 6-12)	10-001424-3	28815
C1	CAP,FXD,ELCTLT	M39003/01-2499	81349
C2,4,6,10,12,13	CAP,FXD,CER	M39014/02-1270	81349
C3,5,11	CAP,FXD,ELCTLT	M39003/01-2526	81349
C7-9	CAP,FXD,CER	M39014/01-1495	81349
CR1-4	SCND DVC,DIODE	JANTX1N4148	81349
Q1,3,4	TRANSISTOR	JANTX2N2907A	81349
Q2	TRANSISTOR	JANTX2N2222A	81349
R1	RES,VAR,WW	M39015/3-009WP	81349
R2,3,11	RES,FXD,CMPSN	RCR05G103JP	81349
R4,5,7,10	RES,FXD,CMPSN	RCR05G222JP	81349
R6	RES,FXD,CMPSN	RCR05G511JP	81349
R8,9	RES,FXD,CMPSN	RCR05G200JP	81349
R12,13	RES,FXD,CMPSN	RCR07G202JP	81349
R14	RES,VAR,NWW	RJR24FW503P	81349
R15	RES,FXD,CMPSN	RCR05G823JP	81349
R16	RES,FXD,CMPSN	RCR05G221JP	81349
R18,19	RES,FXD,CMPSN	RCR05G472JP	81349
R20	PARTS KIT	21-140016-1	28815
R21	RES,VAR,WW	M39015/3-010WP	81349
R22,23	RES,FXD,CMPSN	RCR05G101JP	81349
U1,2	MICROCKT,DGTL	M38510/10404BEB	81349
U3	MICROCKT,LIN	LM120H-12/883B	27014

Table 6-11. Decoder CCA A2A2 - Continued

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
U4	MICROCKT,DGTL	M38510/00801BDB	81349
U5	MICROCKT,DGTL (DAC01)	DAC01FY	06665

ESL-1372 (3/83)

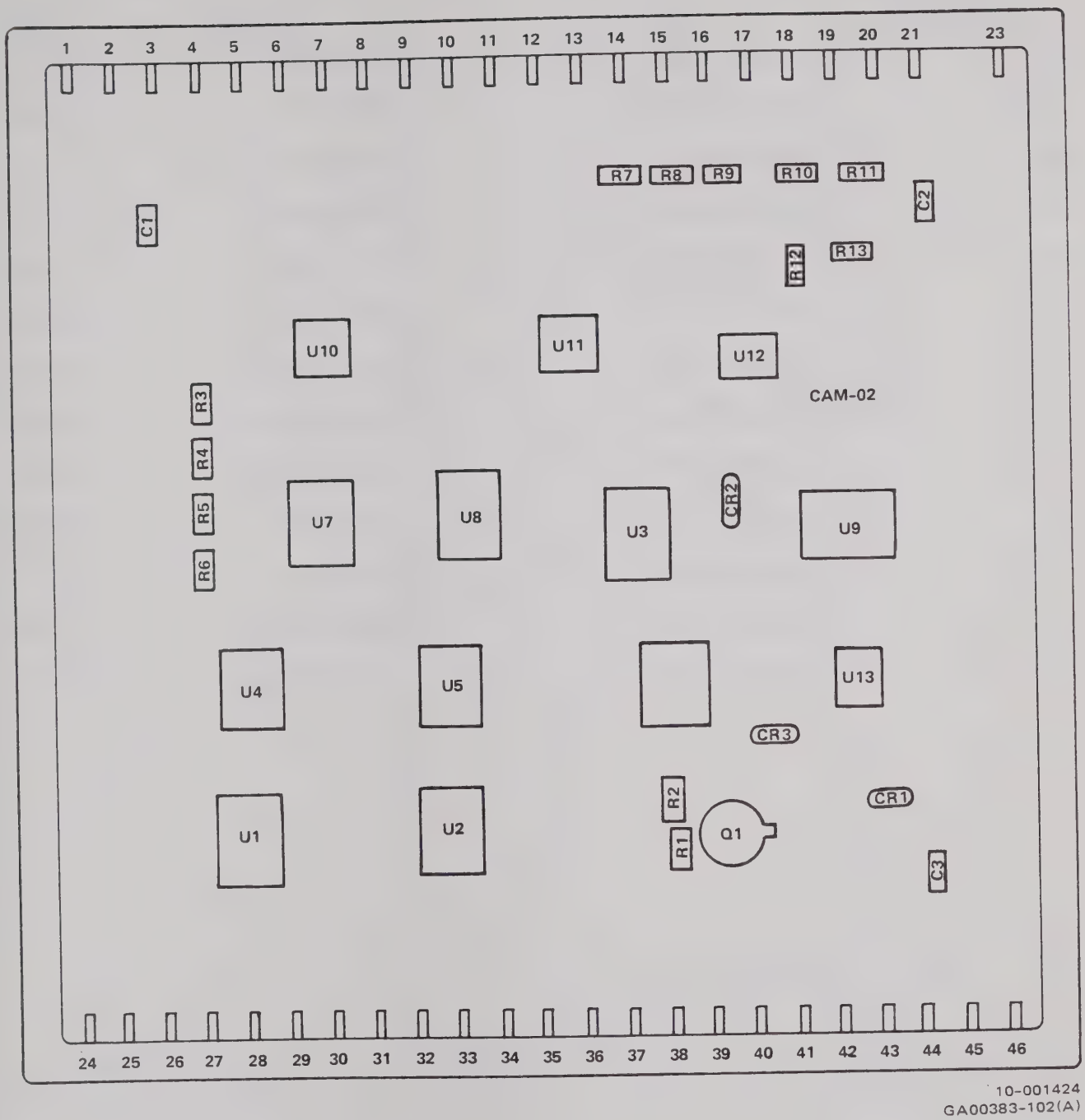
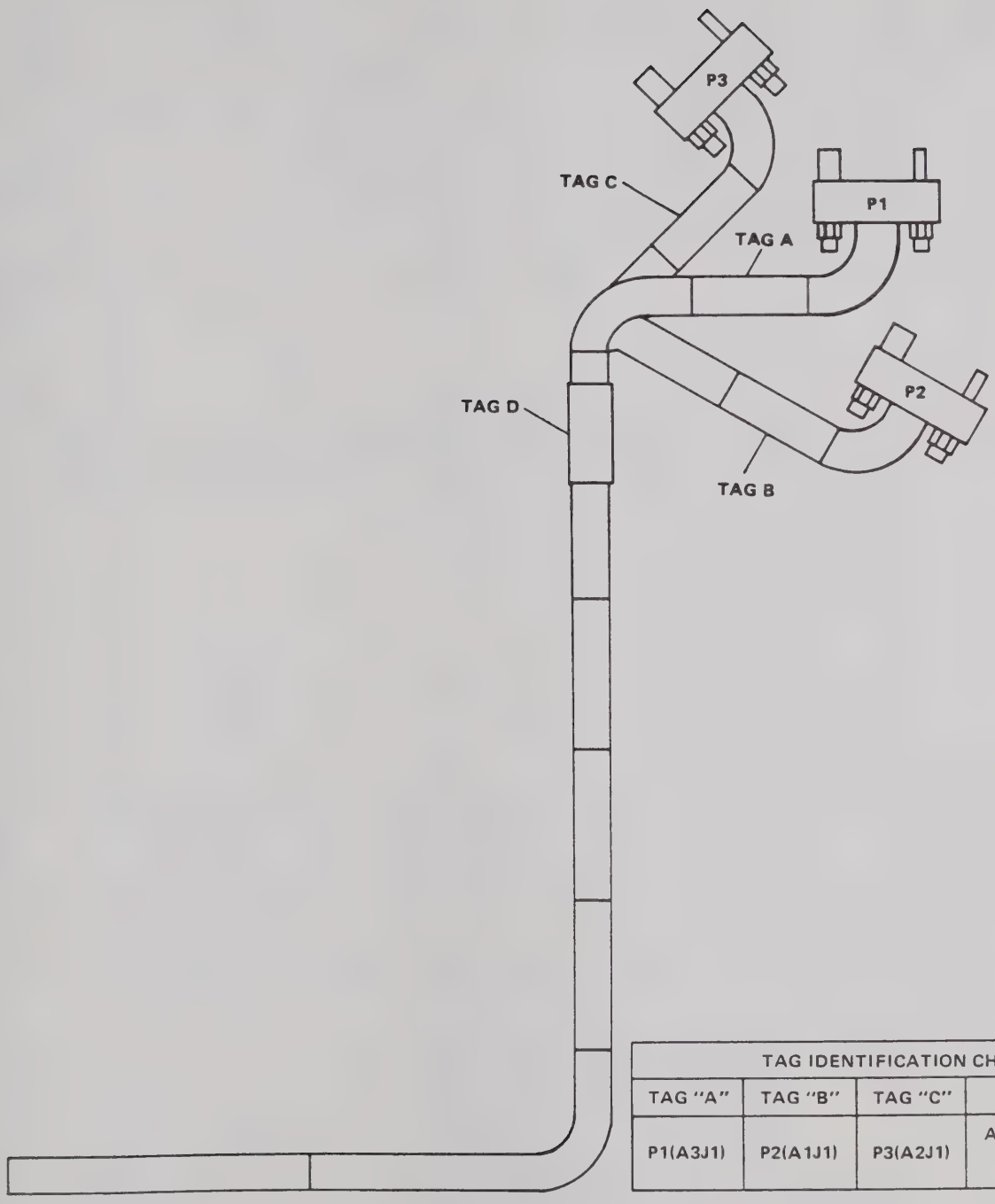


Figure 6-12. Substrate Assembly A2A2A1

Table 6-12. Substrate Assembly A2A2A1

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
C1-3	CAP,FXD,CHIP	250R11W103KP	29454
CR1-3	SCND DVC,DIODE	MMCD914-1	04713
Q1	TRANSISTOR	2N2222ADICE	27014
R1	RES,FXD,FILM	MCRA1002J4	52262
R2	RES,FXD,FILM	MCRA2202JY	52262
R3-13	RES,FXD,FILM	MCRA2701JY	52262
U1-3	MICROCKT,DGTL	93L08XMDICE	34335
U4-6	MICROCKT,DGTL	DM54L164DICE	27014
U7,8	MICROCKT,DGTL	DM54L154DICE	27014
U9	MICROCKT,LIN	DAC-01-M-C	06665
U10,11	MICROCKT,DGTL	CD4050AH	18714
U12	MICROCKT,DGTL	DM54L02DICE	27014
U13	MICROCKT,LIN	DGM111ADICE	17856

ESL-1372 (3/83)



TAG IDENTIFICATION CHART			
TAG "A"	TAG "B"	TAG "C"	TAG "D"
P1(A3J1)	P2(A1J1)	P3(A2J1)	ASSY 10-124329-1 28815 W1

10-124329-1
GA00383-103(A)

Figure 6-13. Special Purpose Cable Assembly A2W1

Table 6-13. Special Purpose Cable Assembly A2W1

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
P1	CONN,PLUG,ELEC	SLE20SJ	81312
P2	CONN,PLUG,ELEC	SLE14SJ	81312
P3	CONN,RECP,ELEC	SLE14PJR	81312

ESL-1372 (3/83)

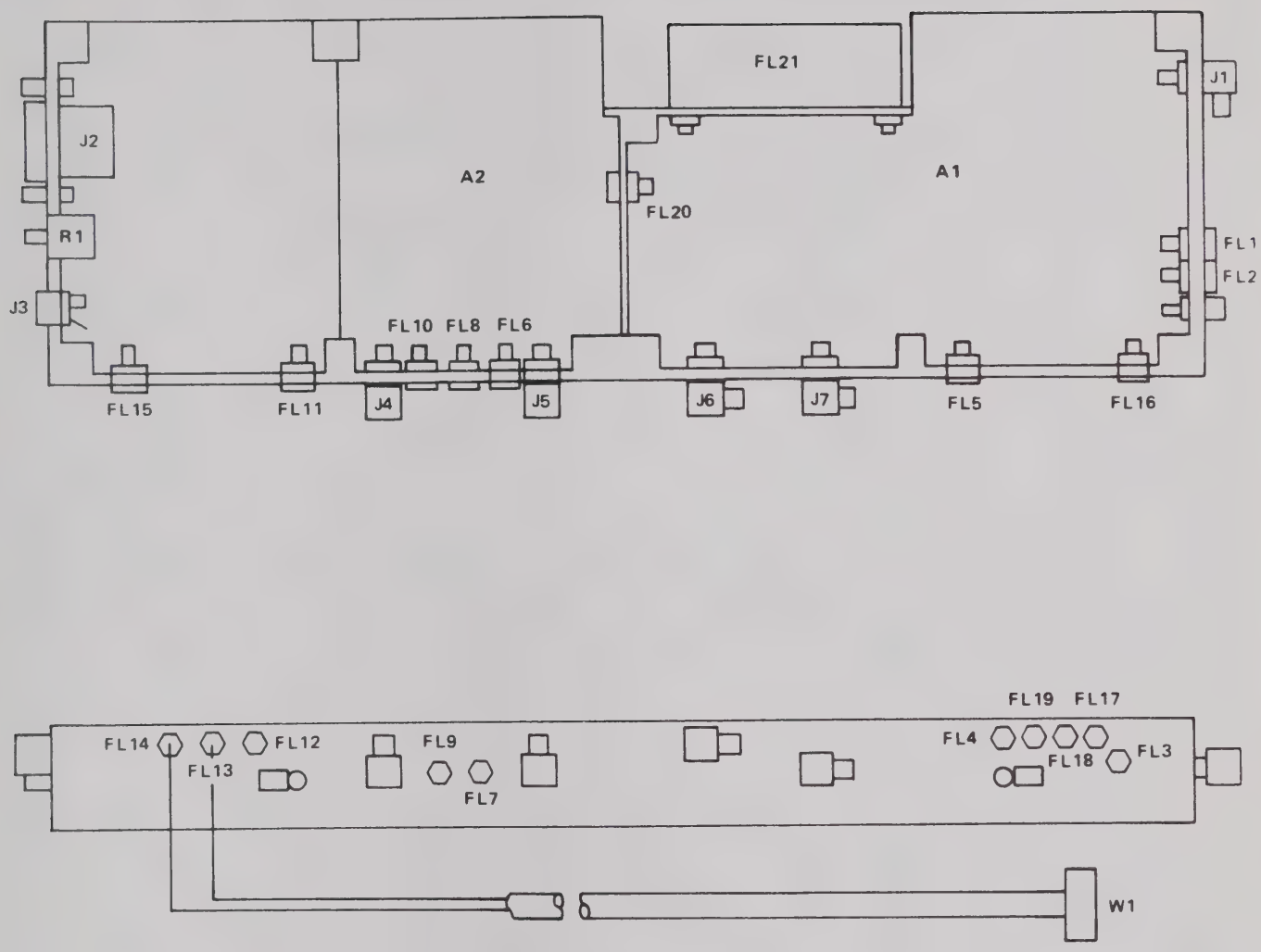
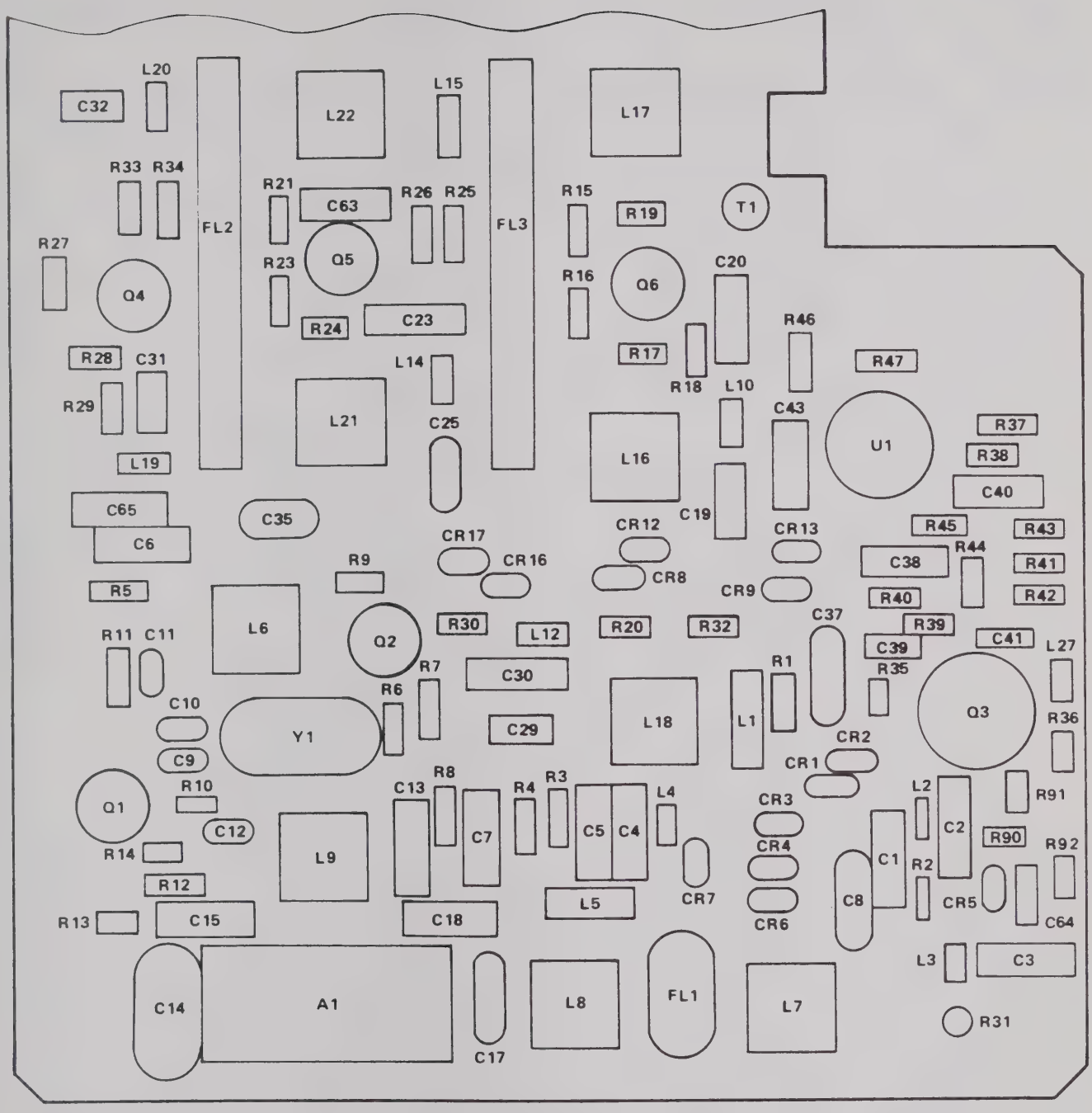


Figure 6-14. First and Second IF Amplifier/Detector ECA A3

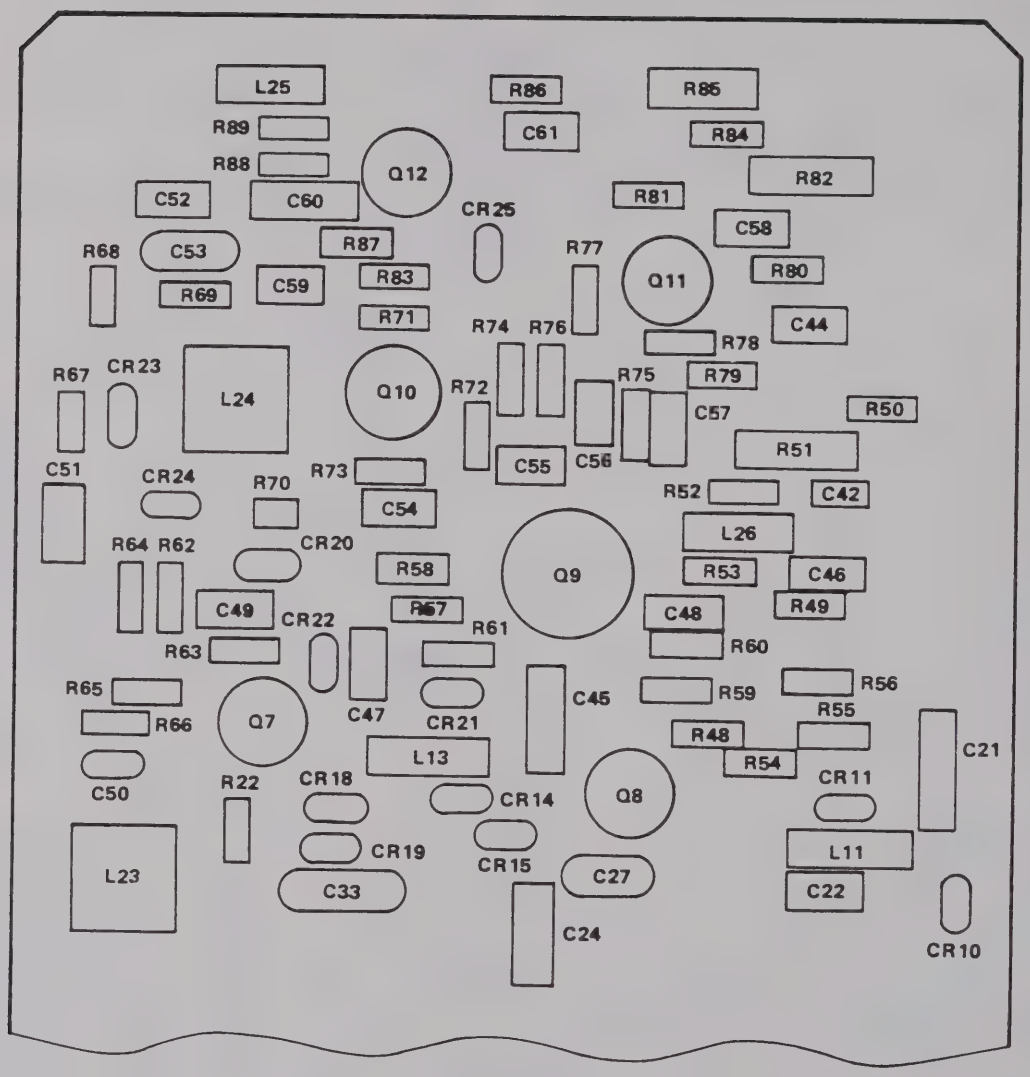
Table 6-14. First and Second IF Amplifier/Detector ECA A3

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
A3	ELECTRONIC COMPONENT ASSY, IF AMP	10-123907-2	28815
A1	CCA,FIRST IF AMPLIFIER/ DETECTOR (SEE FIGURE 6-15)	10-123774-1	28815
A2	CCA,SECOND IF AMPLIFIER/ DETECTOR (SEE FIGURE 6-16)	10-123784-1	28815
FL1-20	FILTER,RFI,10 AMP,200V, 0.022 UF	51-712-003	33095
FL21	FILTER,BANDPASS	001-26680	28815
J1,4-7	CONN,RCPT,ELEC	51-047-0000-220	98291
J2	CONN,RCPT,ELEC	DEJ9MP	71468
J3	JACK,TELEPHONE	17-123666-1	28815
R1	RES,VAR,CMPSN,25K,10%,1/2W	RV6NAYSD252A	81349
W1	CABLE ASSY,SP (SEE FIGURE 6-17)	10-124330-1	28815



10 123774

Figure 6-15. First IF Amplifier/Detector CCA A3A1 (Sheet 1 of 2)



10-123774-1
GA00383-104(A)

Figure 6-15. First IF Amplifier/Detector CCA A3A1 (Sheet 2 of 2)

Table 6-15. First IF Amplifier/Detector CCA A3A1

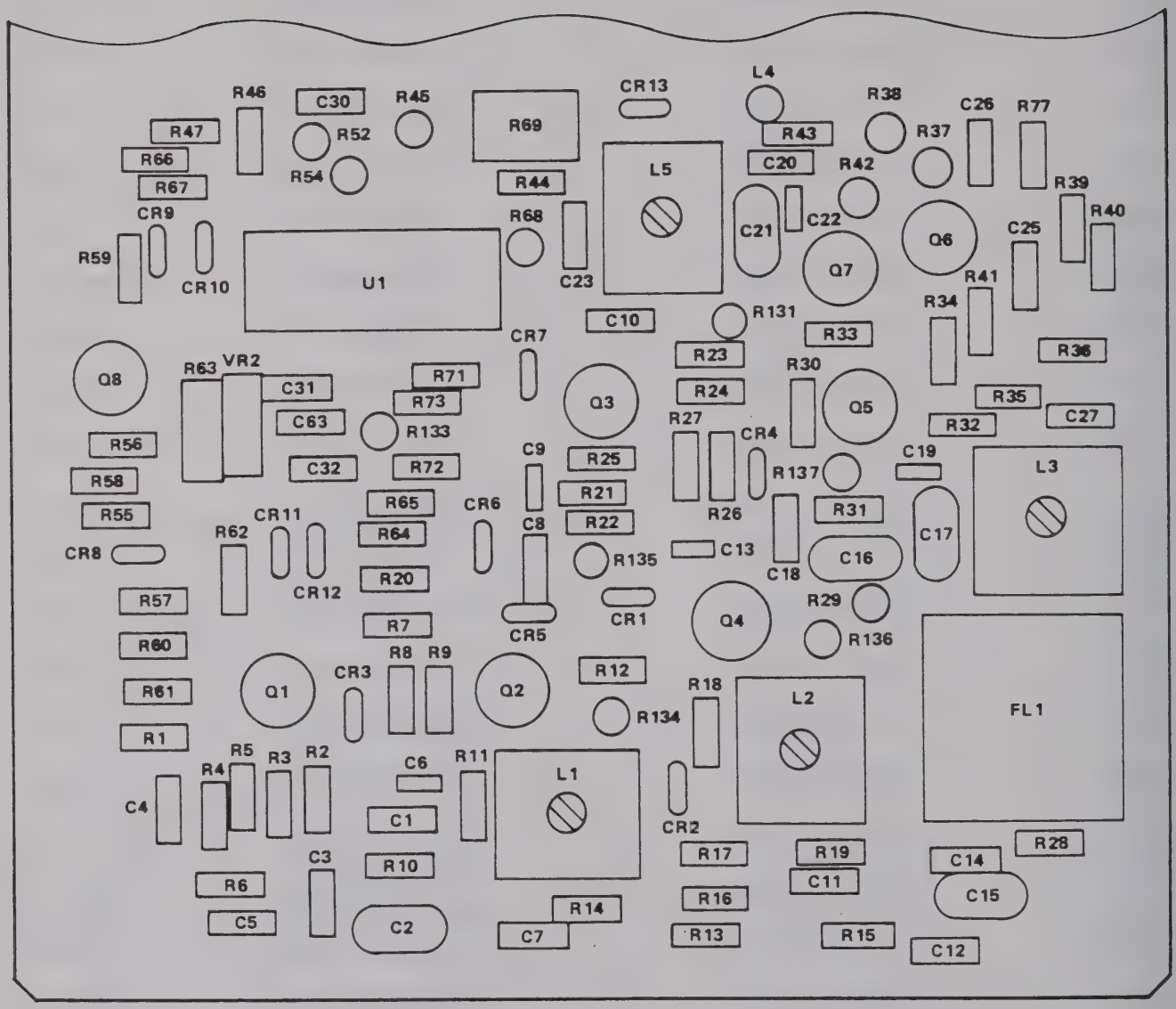
REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
A1	MIXER,DOUBLE-BALANCED	MD-138	21912
C1-5,7,18-24,29, 31,32,40,44, 45,49,54,64	CAP,FXD,CER	M39014/01-1495	81349
C6,13,38,43,51, 52,58,61,63,65	CAP,FXD,CER	M39014/02-1270	81349
C8,17	CAP,FXD,MICA	CMR03C8R0DOCP	81349
C9	CAP,FXD,MICA	CMR03F121JOYP	81349
C10	CAP,FXD,MICA	CMR03E620JOYP	81349
C11,12,39,41,42, 46-48,55-57, 59,60	CAP,FXD,CER	8111-100X7R0681K	18796
C14,30	CAP,FXD,CER	CCR06CG102JP	81349
C15	CAP,FXD,CER	CCR06CG391JP	81349
C25,27	CAP,FXD,MICA	CMR03E300JOYP	81349
C33,35,50,53	CAP,FXD,MICA	CMR03E510JOYP	81349
C37	CAP,FXD,MICA	CMR05F331JODP	81349
CR1-19	SCND DVC,DIODE	TX-3188	50434
CR20-22,25	SCND DVC,DIODE	TX-3081	50434
CR23,24	SCND DVC,DIODE (SWITCHING)	JANTX1N4148	81349
FL1	FILTER,BANDPASS	4102F	25120
FL2	FILTER,LOWPASS	TF1863	25120
FL3	FILTER,BANDPASS	TF1474	25120
L1-5,10-15,19, 20,25-27	COIL,RF	MS75084-14	96096
L6	COIL,RF	558-7107-15	71279
L7,8	COIL,RF	558-7107-17	71279

Table 6-15. First IF Amplifier/Detector CCA A3A1 - Continued

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
L9	COIL,RF	558-7107-05	71279
L16,17	COIL,RF	558-7107-23	71279
L18	COIL,RF	558-7107-13	71279
L21-24	COIL,RF	558-7107-21	71279
Q1,11,12	TRANSISTOR	17-123787-5	28815
Q2,7,10	TRANSISTOR	JANTX2N918	81349
Q3,9	TRANSISTOR	U322-2	17856
Q4-6,8	TRANSISTOR	JANTX2N2907A	81349
R1,20,22,31,64, 70,76	RES,FXD,CMPSN	RCR05G471JP	81349
R2-4,7,12,35,36, 39,53,58	RES,FXD,CMPSN	RCR05G100JP	81349
R5,14,30,50,63 67,68,72,79, 83,90,91	RES,FXD,CMPSN	RCR05G220JP	81349
R6	RES,FXD,CMPSN	RCR05G621JP	81349
R8,9,65,71,77, 89,92	RES,FXD,CMPSN	RCR05G470JP	81349
R10,55,62,73	RES,FXD,CMPSN	RCR05G103JP	81349
R11,40,44,46,49, 60	RES,FXD,CMPSN	RCR05G102JP	81349
R13,81,86	RES,FXD,CMPSN	RCR05G510JP	81349
R15	RES,FXD,CMPSN	RCR05G112JP	81349
R16,23,28	RES,FXD,CMPSN	RCR05G302JP	81349
R17,18,24,25,29, 34	RES,FXD,CMPSN	RCR05G101JP	81349
R19,26,33	RES,FXD,CMPSN	RCR07G202JP	81349

Table 6-15. First IF Amplifier/Detector CCA A3A1 - Continued

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
R21,27	RES,FXD,CMPSN	RCR05G182JP	81349
R32	RES,FXD,CMPSN	RCR05G132JP	81349
R37	RES,FXD,CMPSN	RCR05G273JP	81349
R38	RES,FXD,CMPSN	RCR05G513JP	81349
R41,43	RES,FXD,CMPSN	RCR05G750JP	81349
R42,52	RES,FXD,CMPSN	RCR05G912JP	81349
R45,47,59	RES,FXD,CMPSN	RCR05G472JP	81349
R48	RES,FXD,CMPSN	RCR05G203JP	81349
R51	RES,FXD,CMPSN	RCR07G361JP	81349
R54	RES,FXD,CMPSN	RCR05G682JP	81349
R56	RES,FXD,CMPSN	RCR05G113JP	81349
R57	RES,FXD,CMPSN	RCR05G241JP	81349
R61	RES,FXD,CMPSN	RCR05G751JP	81349
R66,69	RES,FXD,CMPSN	RCR05G432JP	81349
R74	RES,FXD,CMPSN	RCR05G391JP	81349
R75,88	RES,FXD,CMPSN	RCR05G474JP	81349
R78,87	RES,FXD,CMPSN	RCR05G394JP	81349
R80,84	RES,FXD,CMPSN	RCR05G334JP	81349
R82,85	RES,FXD,CMPSN	RCR07G331JP	81349
T1	COIL,RF	12-126590-1	28815
U1	MICROCKT,DGTL	MC1558BGBS	04713
Y1	XTAL UNIT, QTZ	CR-112/U19.300000 MHz	81349



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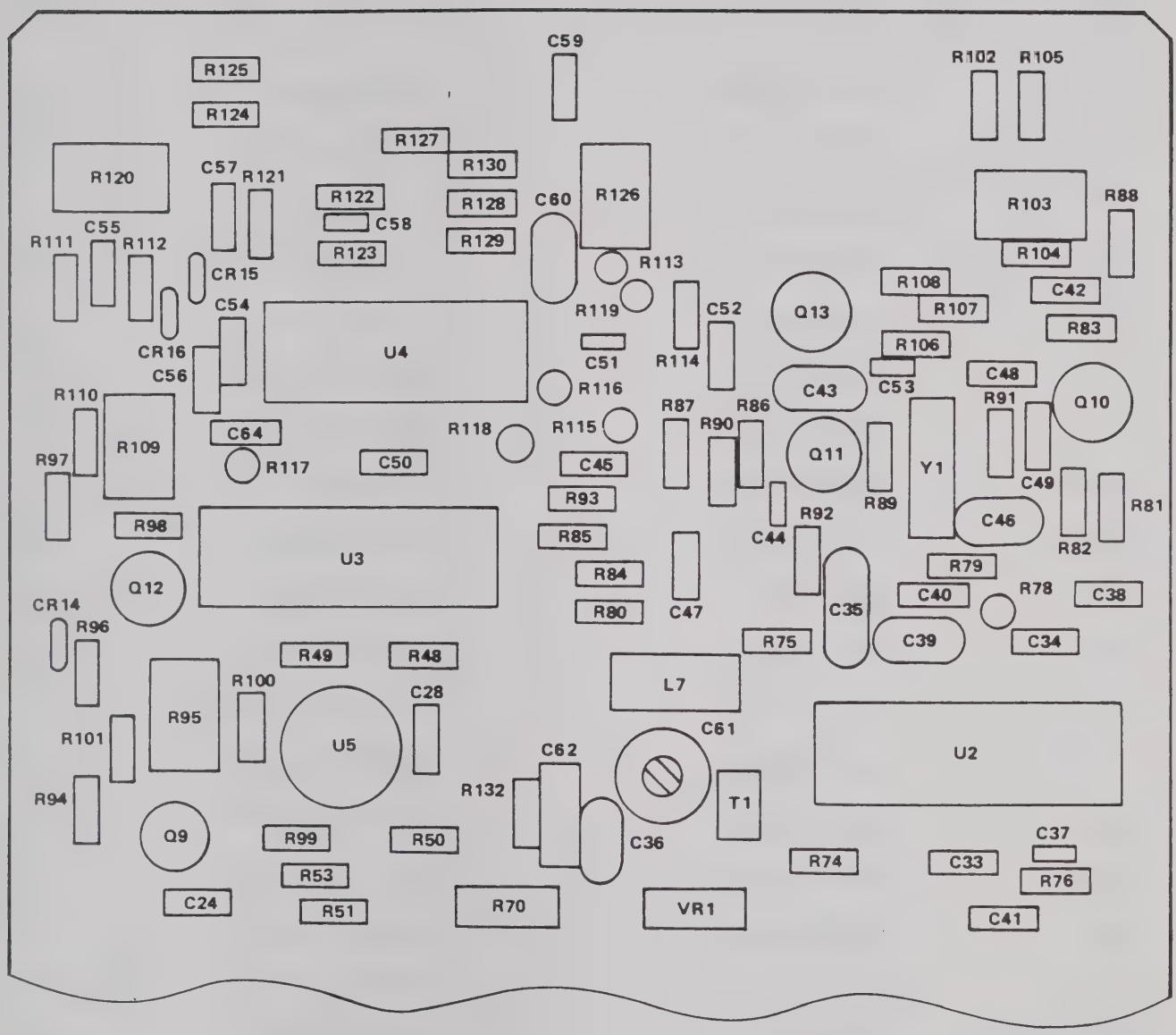
GA00383-105(A)

Figure 6-16. Second IF Amplifier/Detector CCA A3A2 (Sheet 1 of 2)



10-123784-1
GA00383-106(A)

Figure 6-16. Second IF Amplifier/Detector CCA A3A2 (Sheet 2 of 2)

Table 6-16. Second IF Amplifier/Detector CCA A3A2

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
C1,3,4,11,25,34, 38,42,45,55,63	CAP,FXD,CER	M39014/02-1258	81349
C2,15,16,21	CAP,FXD,MICA	CMR03E510JOYP	81349
C5,7,10,12,20, 24,26-28,32,33, 40,47,49,52,56	CAP,FXD,CER	M39014/02-1270	81349
C6,8,9,13,14,17- 19,22,37,41, 44,51,53,58	CAP,FXD,CER	8111-100X7R0681K	18796
C23,48	CAP,FXD,CER	M39014/02-1254	81349
C30	CAP,FXD,CER	M39014/01-1488	81349
C31,50	CAP,FXD,CER	M39014/02-1411	81349
C35,39	CAP,FXD,MICA	CMR03E820JOYP	81349
C36	PARTS KIT	21-130059-1	28815
C43,46	PARTS KIT	21-130569-1	28815
C54	CAP,FXD,CER	M39014/02-1280	81349
C57,59	CAP,FXD,CER	M39014/02-1265	81349
C60	CAP,FXD,MICA	CMR03F131JOYP	81349
C61	CAP,VAR,AIR	8053	91293
C62	CAP,FXD,CER	10TCU-Q10	56289
C64	CAP,FXD,MICA	CMR03E620JOYP	81349
CR1,2,5-12,14	SCND DVC,DIODE	JANTX1N4148	81349
CR3,4	SCND DVC,DIODE	TX-3081	50434
CR13,15,16	SCND DVC,DIODE	JANTX1N5711	81349
FL1	FILTER,BANDPASS	001-26660	28815
L1-3,5	COIL,RF	558-7107-21	71279

ESL-1372 (3/83)

Table 6-16. Second IF Amplifier/Detector CCA A3A2 - Continued

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
L4	COIL,RF	MS75084-14	96096
L7	COIL,RF	MS75084-16	96096
Q1,2,4,6,7	TRANSISTOR	JANTX2N918	81349
Q3,5,10,11,13	TRANSISTOR	17-123787-5	28815
Q8	TRANSISTOR	JANTX2N2946A	81349
Q9	TRANSISTOR	JANTX2N2484	81349
Q12	TRANSISTOR	JANTX2N2907A	81349
R1	RES,FXD,CMPSN	RCR05G470JP	81349
R2,42,124,130	RES,FXD,CMPSN	RCR05G100JP	81349
R3,121,127	RES,FXD,CMPSN	RCR05G752JP	81349
R4	RES,FXD,CMPSN	RCR05G751JP	81349
R5	RES,FXD,CMPSN	RCR05G682JP	81349
R6,11,13,15,18, 34,43,47,76, 114,131,134-137	RES,FXD,CMPSN	RCR05G220JP	81349
R7,24,25,40	RES,FXD,CMPSN	RCR05G510JP	81349
R8,26,88	RES,FXD,CMPSN	RCR05G391JP	81349
R9	RES,FXD,CMPSN	RCR05G821JP	81349
R10,50,51,98, 122,128	RES,FXD,CMPSN	RCR05G103JP	81349
R12	RES,FXD,CMPSN	RCR05G471JP	81349
R14	RES,FXD,CMPSN	RCR05G432JP	81349
R16	PARTS KIT	21-133838-1	28815
R17	RES,FXD,CMPSN	RCR05G151JP	81349
R19	RES,FXD,CMPSN	RCR05G332JP	81349
R20,30,62	RES,FXD,CMPSN	RCR05G474JP	81349

Table 6-16. Second IF Amplifier/Detector CCA A3A2 - Continued

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
R21,31	RES,FXD,CMPSN	RCR05G394JP	81349
R22,32	RES,FXD,CMPSN	RCR05G334JP	81349
R23	RES,FXD,CMPSN	RCR05G331JP	81349
R27	RES,FXD,CMPSN	RCR05G271JP	81349
R28,29,56	RES,FXD,CMPSN	RCR05G622JP	81349
R33,37,86,113	RES,FXD,CMPSN	RCR05G101JP	81349
R35	RES,FXD,CMPSN	RCR05G131JP	81349
R36,38	RES,FXD,CMPSN	RCR05G241JP	81349
R39,41	RES,FXD,CMPSN	RCR05G681JP	81349
R44,74,75,83,87	RES,FXD,CMPSN	RCR05G202JP	81349
R45,46,65,110, 119	RES,FXD,CMPSN	RCR05G392JP	81349
R48,112,117	RES,FXD,CMPSN	RCR05G104JP	81349
R49,57,61,80,85	RES,FXD,CMPSN	RCR05G473JP	81349
R52,54,58	RES,FXD,CMPSN	RCR05G133JP	81349
R53,125,133	RES,FXD,CMPSN	RCR05G561JP	81349
R55	RES,FXD,CMPSN	RCR05G822JP	81349
R59,71,73,99	RES,FXD,CMPSN	RCR05G203JP	81349
R60	RES,FXD,CMPSN	RCR05G225JP	81349
R63,70	RES,FXD,CMPSN	RCR05G751JP	81349
R64,102,105	RES,FXD,CMSPN	RCR05G362JP	81349
R66	RES,FXD,CMPSN	RCR05G390JP	81349
R67	RES,FXD,CMPSN	RCR05G273JP	81349
R68	PARTS KIT	21-130568-1	28815

ESL-1372 (3/83)

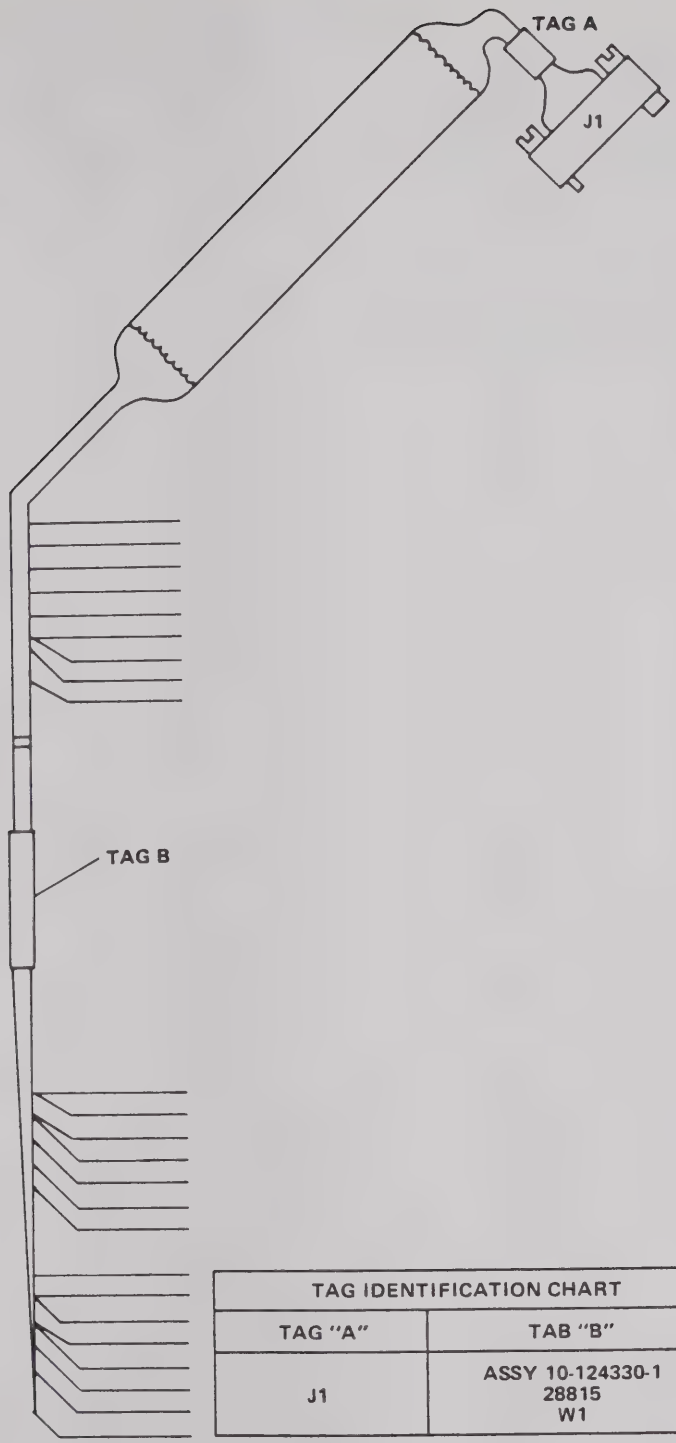
Table 6-16. Second IF Amplifier/Detector CCA A3A2 - Continued

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
R69,95	RES,VAR,NWW	RJR26FW103P	81349
R72	RES,FXD,CMPSN	RCR05G512JP	81349
R77,78,101,115	RES,FXD,CMPSN	RCR05G102JP	81349
R79	RES,FXD,CMPSN	RCR05G243JP	81349
R81,89,116,118	RES,FXD,CMPSN	RCR05G124JP	81349
R82	RES,FXD,CMPSN	RCR05G113JP	81349
R84	RES,FXD,CMPSN	RCR05G154JP	81349
R90	RES,FXD,CMPSN	RCR05G913JP	81349
R91	RES,FXD,CMPSN	RCR05G223JP	81349
R92	RES,FXD,CMPSN	RCR05G393JP	81349
R93	RES,FXD,CMPSN	RCR05G911JP	81349
R94	RES,FXD,CMPSN	RCR05G123JP	81349
R96	RES,FXD,CMPSN	RCR05G222JP	81349
R97	RES,FXD,CMPSN	RCR05G753JP	81349
R100	RES,FXD,CMPSN	RCR05G105JP	81349
R103,120,126	RES,VAR,WW	RT26C2W502	32997
R104,106,107	RES,FXD,CMPSN	RCR05G513JP	81349
R108	RES,FXD,CMPSN	RCR05G472JP	81349
R109	RES,VAR,WW	RT26C2W202	81349
R111	RES,FXD,CMPSN	RCR05G224JP	81349
R123,129	RES,FXD,CMPSN	RCR05G623JP	81349
R132	RES,FXD,CMPSN	RCR05G823JP	81349
T1	TRANSFORMER,RF	12-123970-1	28815
U1,4	MICROCKT,LIN	RM4136D/883B	07933

Table 6-16. Second IF Amplifier/Detector CCA A3A2 - Continued

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
U2	MICROCKT,LIN	16-131984-1	28815
U3	MICROCKT,DGTL	IH5010MJD/883B	32293
U5	MICROCKT,LIN	LM111H/883B	27014
VR1,2	SCND DVC,DIODE	JANTX1N755A	81349
Y1	XTAL UNIT,QTZ	CR-69A/U10.700000 MHz	81349

ESL-1372 (3/83)



TAG IDENTIFICATION CHART	
TAG "A"	TAB "B"
J1	ASSY 10-124330-1 28815 W1

10-124330-1
GA00383-107(A)

Figure 6-17. Special Purpose Cable Assembly A3W1

Table 6-17. Special Purpose Cable Assembly A3W1

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
J1	CONN,PLUG,ELEC	SLE20PJTU	81312

ESL-1372 (3/83)

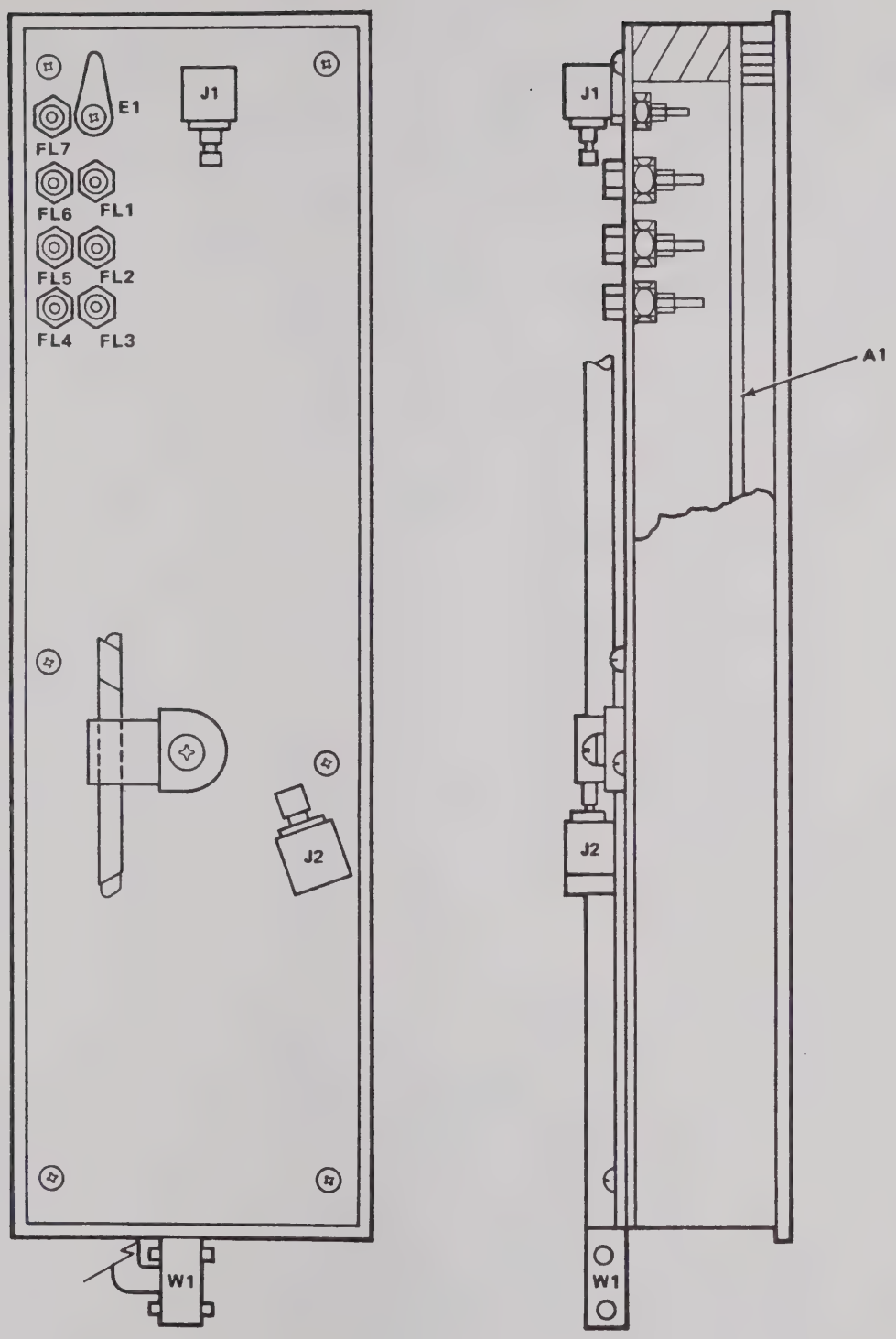
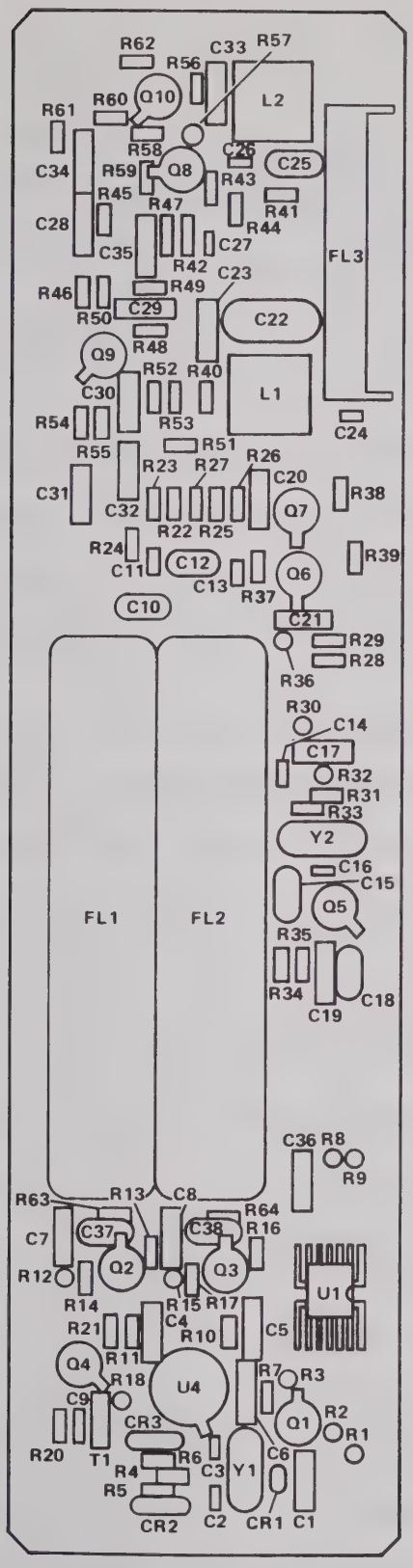


Figure 6-18. Single-Sideband Adapter ECA A4

Table 6-18. Single-Sideband Adapter ECA A4

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
A4	SINGLE-SIDEBAND ADAPTER ECA	10-122925-1	28815
A1	CCA,SINGLE-SIDEBAND (SSB) (SEE FIGURE 6-19)	10-122924-1	28815
W1	CABLE ASSY,SPECIAL PURPOSE SSB (SEE FIGURE 6-20)	10-123947-1	28815

ESL-1372 (3/83)



10-122924-1
AB383

Figure 6-19. Single-Sideband CCA A4A1

Table 6-19. Single-Sideband CCA A4A1

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
A4A1	CCA,SINGLE-SIDEBAND ADAPTER	10-122924-1	28815
C1,4,5,9,17,23, 28-35	CAP,FXD,CER,10000 PF,10%, 200V	M39014/02-1258	81349
C2,3,11,13,14, 16,24,26,27	CAP,FXD,CER,680 PF,10%,100V	8111-100X7R0681K	18796
C6-8,20,21,36	CAP,FXD,CER,0.1 µF,10%,100V	M39014/02-1270	81349
C10,12	CAP,FXD,MICA,10 PF,TOL 0.5 PF,300V	CMR03C100DOCP	81349
C15	CAP,FXD,MICA,39 PF,5%,50V	CMR03E390JOYP	81349
C18	PARTS KIT	21-139827-1	28815
C22	CAP,FXD,MICA,220 PF,5%,500V	CMR05F221JODP	81349
C25	CAP,FXD,MICA,51 PF,5%,50V	CMR03E510JOYP	81349
C37,38	CAP,FXD,MICA,18 PF,TOL 0.5 PF,300V	CMR03C180DOCP	81349
CR1	SCND,DVC,DIODE	JANTXIN4198	81349
CR2	PARTS KIT	21-133389-1	28815
CR3	SCND,DVC,DIODE,100 PF,2%	DS1750CBURNEDIN	28815
FL1	FILTER,BANDPASS,USB	5269644010	13499
FL2	FILTER,BANDPASS,USB	5269645010	13499
FL3	FILTER,BANDPASS,10.7 MHz/ 30 kHz BW	TF1474	25120
L1	COIL,RF,0.1 µH	558-7107-13	71279
L2	COIL,RF,4.7 µH	588-7107-21	71279
Q1-4,9,10	TRANSISTOR	JANTX2N918	81349
Q5-8	TRANSISTOR	17-123787-5	28815
R1,2,8,12-18,20, 21,47,50,62	RES,FXD,CMPSN,51 OHM,5%, 1/8W	RCR05G510JP	81349

ESL-1372 (3/83)

Table 6-19. Single-Sideband CCA A4A1 - Continued

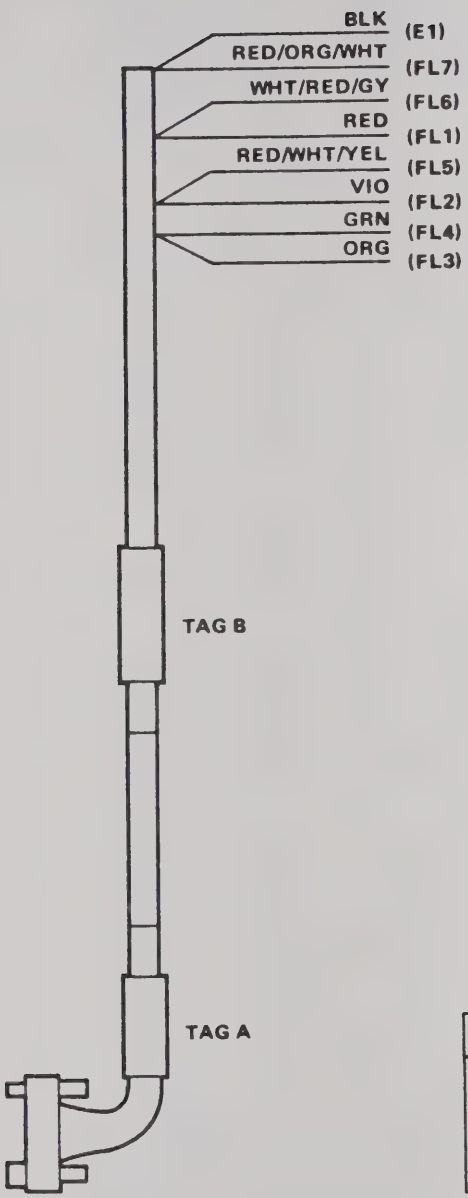
REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
R3	RES,FXD,CMPSN,7.5K,5%,1/8W	RCR05G752JP	81349
R8,9,24,27,35-37,49,63,64	RES,FXD,CMPSN,1K,5%,1/8W	RCR05G102JP	81349
R4,51	RES,FXD,CMPSN,10K,5%,1/8W	RCR05G103JP	81349
R5,6	RES,FXD,CMPSN,33K,5%,1/8W	RCR05G333JP	81349
R7,31	RES,FXD,CMPSN,2K,5%,1/8W	RCR05G202JP	81349
R10,11	RES,FXD,CMPSN,20K,5%,1/8W	RCR05G203JP	81349
R22,25	RES,FXD,CMPSN,1M,5%,1/8W	RCR05G105JP	81349
R23,26,29,33,34,43,44	RES,FXD,CMPSN,390K,5%,1/8W	RCR05G394JP	81349
R28	RES,FXD,CMPSN,470K,5%,1/8W	RCR05G474JP	81349
R30,48	RES,FXD,CMPSN,22 OHM,5%,1/8W	RCR05G220JP	81349
R32,42	RES,FXD,CMPSN,680K,5%,1/8W	RCR05G684JP	81349
R38-40	RES,FXD,CMPSN,47 OHM,5%,1/8W	RCR05G470JP	81349
R41,57,58	RES,FXD,CMPSN,6.8K,5%,1/8W	RCR05G682JP	81349
R45	RES,FXD,CMPSN,150 OHM,5%,1/8W	RCR05G151JP	81349
R46	RES,FXD,CMPSN,510 OHM,5%,1/8W	RCR05G511JP	81349
R52,54,56,69,61	RES,FXD,CMPSN,10 OHM,5%,1/8W	RCR05G100JP	81349
R53	RES,FXD,CMPSN,5.1K,5%,1/8W	RCR05G512JP	81349
R55	RES,FXD,CMPSN,750 OHM,5%,1/8W	RCR05G751JP	81349
R60	RES,FXD,CMPSN,680 OHM,5%,1/8W	RCR05G681JP	81349
T1	TRANSFORMER,RF,9.5 μH	12-123969-1	28815
U1	MICROCKT,DGTL,54H00	M38510/02304BDB	81349

ESL-1372 (3/83)

Table 6-19. Single-Sideband CCA A4A1 - Continued

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
U2	MICROCKT,DGTL,5405	M38510/02305BDB	81349
U3	MICROCKT,DGTL,5406	M38510/00801BDB	81349
U4	MICROCKT,DGTL,741	M38510/10101BGC	81349

ESL-1372 (3/83)



TAG IDENTIFICATION CHART	
TAG "A"	TAG "B"
J3	ASSY 10-123947-1 28815 W1

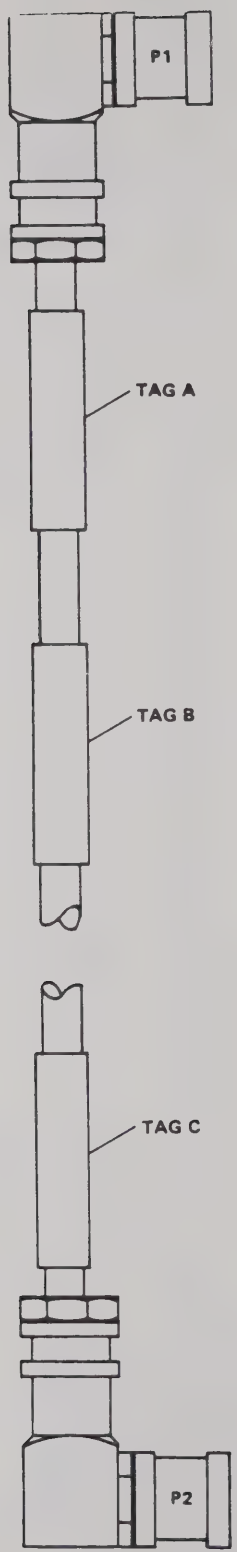
10-123947-1
AB382

Figure 6-20. Special Purpose Cable Assembly A4W1

Table 6-20. Special Purpose Cable Assembly A4W1

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
A4W1	SPECIAL PURPOSE CABLE ASSY	10-123947-1	28815
J3	CONN,RCPT,ELEC	SLE14SJTUR	81312

ESL-1372 (3/83)



TAG IDENTIFICATION CHART		
TAG "A"	TAG "B"	TAG "C"
P1(A1J1)	10-123940-1 28815 W1	P2(A1J2)

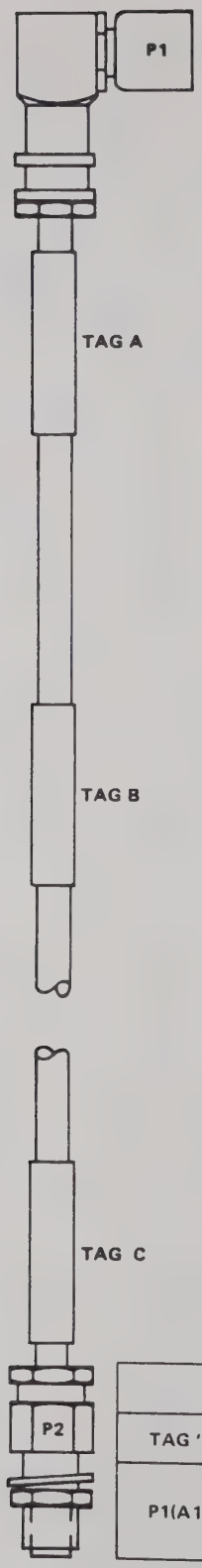
10-123940-1
GA00383-108(A)

Figure 6-21. RF Cable Assembly W1

Table 6-21. RF Cable Assembly W1

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
W1	CABLE ASSY,RF	10-123940-1	28815
P1,2	CONN,PLUG,ELEC	51-311-3850-220	98291

ESL-1372 (3/83)



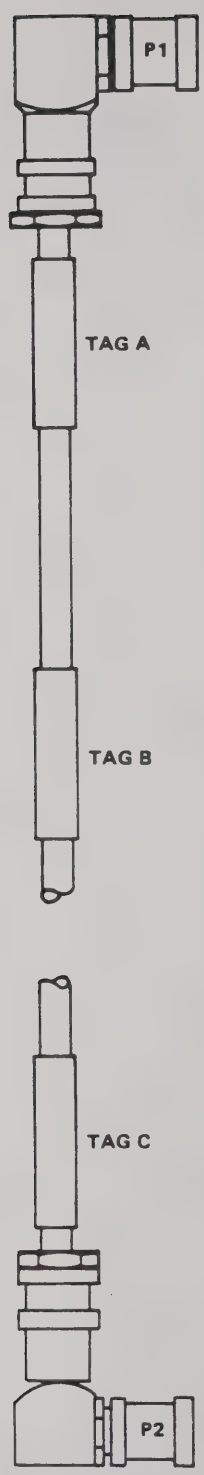
TAG IDENTIFICATION CHART		
TAG "A"	TAG "B"	TAG "C"
P1(A1J10)	10-124026-1 28815 W2	P2(A1J5)

10-124026-1
GA00383-109(A)

Figure 6-22. RF Cable Assembly W2

Table 6-22. RF Cable Assembly W2

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
W2	CABLE ASSY,RF	10-124026-2	28815
P1	CONN,PLUG,ELEC	51-311-3850-220	98291
P2	CONN,RCPT,ELEC	BJ69-5A	14949



TAG IDENTIFICATION CHART			
CONFIG	TAG "A"	TAG "B"	TAG "C"
-1	P1(A1J7)	10-124027-1 28815 W3	P2(A2J2)
-2	P1(A1J7)	10-124027-2 28815 W3	P2(A2J2)

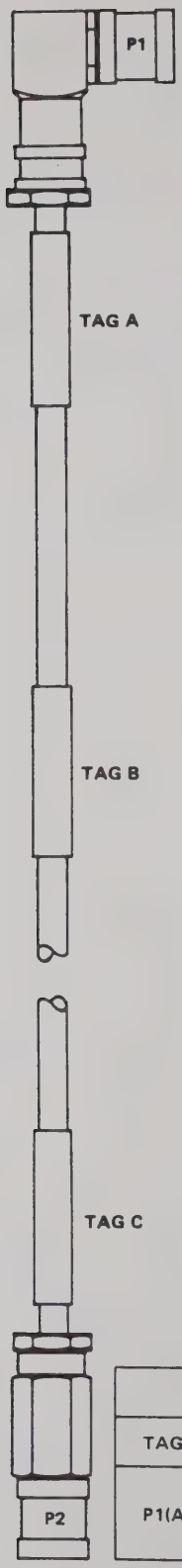
10-124027-1
GA00383-110(A)

Figure 6-23. RF Cable Assembly W3

Table 6-23. RF Cable Assembly W3

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
W3	CABLE ASSY,RF	10-124027-2	28815
P1	CONN,PLUG,ELEC	51-311-3850	98291
P2	CONN,PLUG,ELEC	51-307-3850	98291

ESL-1372 (3/83)



TAG IDENTIFICATION CHART		
TAG "A"	TAG "B"	TAG "C"
P1(A1J6)	10-124028-1 28815 W4	P2(A2J3)

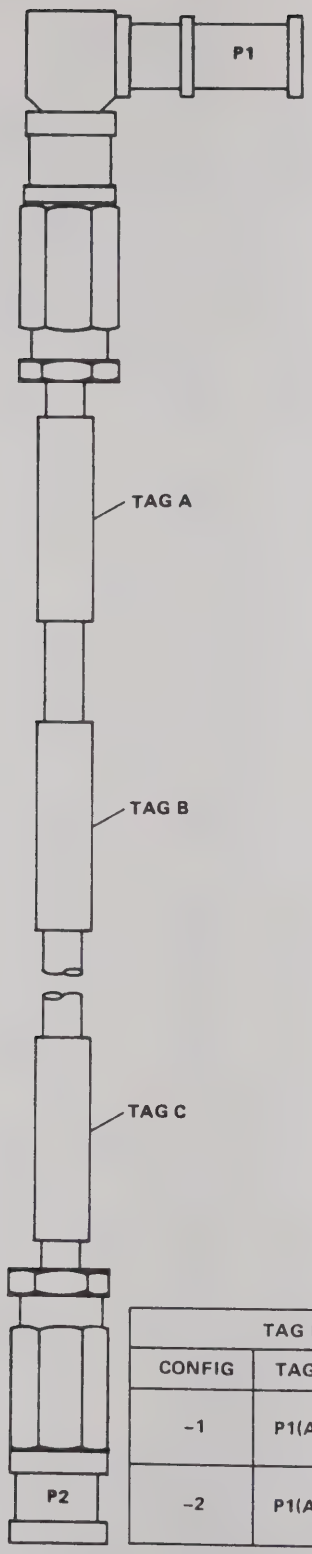
10-124027-1
GA00383-111(A)

Figure 6-24. RF Cable Assembly W4

Table 6-24. RF Cable Assembly W4

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
W4	CABLE ASSY,RF	10-124028-1	28815
P1	CONN,CABLE PLUG	51-311-3850	98291
P2	CONN,PLUG,ELEC	51-307-3850-220	98291

ESL-1372 (3/83)



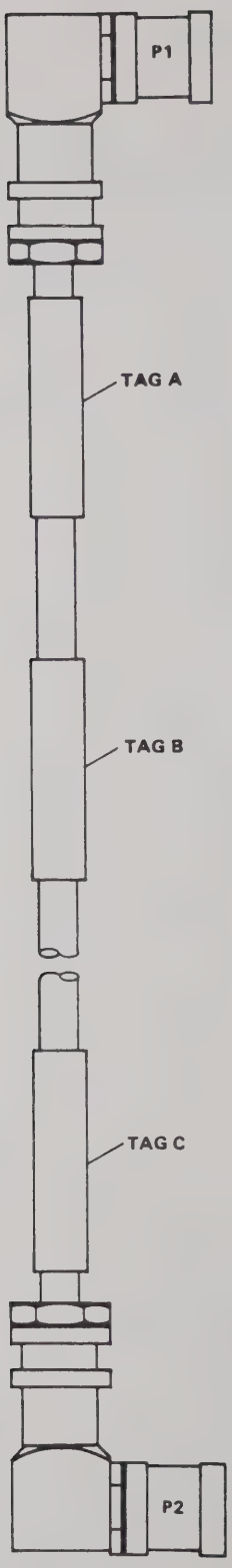
TAG IDENTIFICATION CHART			
CONFIG	TAG "A"	TAG "B"	TAG "C"
-1	P1(A1J3)	10-124029-1 28815 W5	P2(A3J1)
-2	P1(A1J3)	10-124029-2 28815 W5	P2(A3J1)

10-124029-2
GA00383-112(A)

Figure 6-25. RF Cable Assembly W5

Table 6-25. RF Cable Assembly W5

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
W5	CABLE ASSY,RF	10-124029-2	28815
P1	CONN,PLUG,ELEC	51-311-3850-220	98291
P2	CONN,PLUG,ELEC	51-307-3850-220	98291



TAG IDENTIFICATION CHART			
CONFIG	TAG "A"	TAG "B"	TAG "C"
-1	P1(A1J5)	10-124030-1 28815 W6	P2(A1J9)
-2	P1(A1J5)	10-124030-2 28815 W6	P2(A1J9)

10-124030-2
GA00383-113(A)

Figure 6-26. RF Cable Assembly W6

Table 6-26. RF Cable Assembly W6

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
W6	CABLE ASSY,RF	10-124030-2	28815
P1,2	CONN,PLUG,ELEC	51-311-3850-220	98291

ESL-1372 (3/83)

TAG IDENTIFICATION CHART				
DASH NO.	TAG "A"	TAG "B"	TAG "C"	"L"
-1	P1(A4J2)	10-124036-1 28815 W7	P2(A3J7)	5.50
-2	P1(A4J1)	10-124036-2 28815 W8	P2(A3J6)	+0.25 7.50 -0.00

10-124036-1, 2

Figure 6-27. RF Cable Assemblies W7 and W8

Table 6-27. RF Cable Assemblies W7 and W8

REFERENCE DESIGNATOR	DESCRIPTION	PART NUMBER	VENDOR CODE
W7	CABLE ASSY,RF	10-124036-1	28815
W8	CABLE ASSY,RF	10-124036-2	28815
P1,P2	CONN,PLUG,ELEC	51-307-3850-220	98291

ESL-1372 (3/83)

APPENDIX A

INTEGRATED CIRCUIT DATA

This appendix contains vendor catalog sheets, which describe the integrated circuits referenced in the functioning of equipment section and in the supporting schematic diagrams. The following data sheets are provided:

Part No.	Name	Page
CA3028B	Differential/Cascode Amplifier	A-2
DAC01	6-Bit D/A Converter	A-3
HPROM-1024	1024-Bit Field-Programmable ROM	A-4
IH5010	4-Channel Analog Switch	A-5
LH0022	Operational Amplifier	A-6
LH0052	Precision FET Operational Amplifier	A-7
LM111	Voltage Comparator	A-8
LM120	3-Terminal Negative Voltage Regulator	A-9
LM741	Operational Amplifier	A-10
MC10137	High-Speed Synchronous Decade Counter	A-11
MC1692	Quad Line Receiver	A-12
RM4136	High-Gain Operational Amplifier	A-13
SG7812	3-Terminal Positive 12-Volt Regulator	A-14
SP8640A	High-Speed Divider	A-15

DIFFERENTIAL/CASCODE AMPLIFIERS

For Communications and Industrial Equipment at Frequencies from DC to 120 MHz▲

8-Lead TO-5

The CA3028A and CA3028B are differential/cascode amplifiers designed for use in communications and industrial equipment operating at frequencies from dc to 120 MHz.

The CA3028B is like the CA3028A but is capable of premium performance particularly in critical dc and differential amplifier applications requiring tight controls for input offset voltage, input offset current, and input bias current.

The CA3053 is similar to the CA3028A and CA3028B but is recommended for IF amplifier applications.

FEATURES

- Controlled for Input Offset Voltage, Input Offset Current, and Input Bias Current▲
- Balanced Differential Amplifier Configuration with Controlled Constant-Current Source to Provide Unexcelled Versatility
- Single- and Dual-Ended Operation
- Operation from DC to 120 MHz▲
- Balanced-AGC Capability▲
- Wide Operating-Current Range

▲ Does Not Apply to the CA3053.

APPLICATIONS

- RF and IF Amplifiers (Differential or Cascode)
- DC, Audio, and Sense Amplifiers
- Converter in the Commercial FM Band
- Oscillator • Mixer • Limiter
- Companion Application Note, ICAN 5337 "Application of the RCA CA3028 Integrated Circuit Amplifier in the HF and VHF Ranges." This note covers characteristics of different operating modes, noise performance, mixer, limiter, and amplifier design considerations.

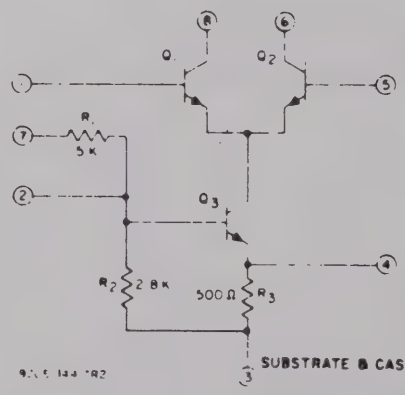
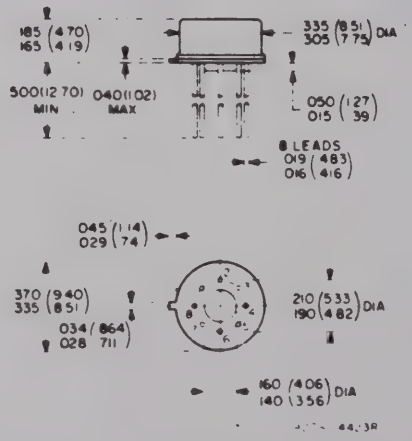


Fig.1 - Schematic diagram for CA3028A, CA3028B and CA3053.

The resistance values included on the schematic diagram have been supplied as a convenience to assist the Equipment Manufacturer in optimizing the selection of "outboard" components of his equipment designs. The values shown may vary as much as ± 30%.

RCA reserves the right to make any changes in the Resistance Values provided such changes do not adversely affect the published performance characteristics of the device.

DIMENSIONAL OUTLINE

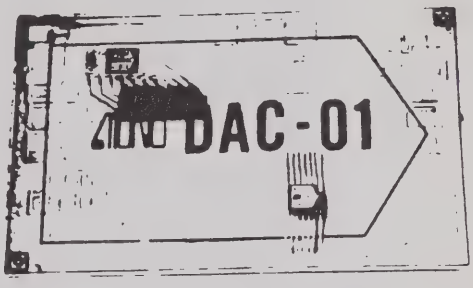


Dimensions in Inches and Millimeters

NOTE: *Dimensions in parentheses are in millimeters and are derived from the basic inch dimensions as indicated.*

FEATURES:

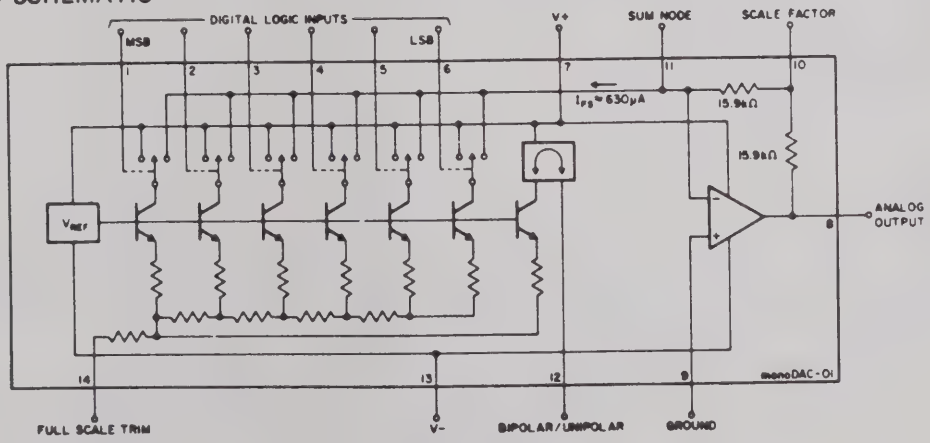
- Completely Self Contained — Includes Reference, Ladder, Switches, Op Amp
- Compact — Single Chip in 14-Pin Package
- 6-Bit Resolution — 7 Bit Accuracy
- Fast — 3 μsec Settling Time (max.)
- Military and Commercial Temperature Ranges Available — -55/+125° C or 0/70° C
- Full Temp Units Processed to MIL-M-38510
- 3 Output Options — +10V, ±5V, ±10V
- Low Power Consumption — 250 mW (max.)
- Standard Power Supplies — ±12V to ±18V
- TTL, DTL Compatible Logic Levels
- Low Cost



GENERAL DESCRIPTION

The monoDAC-01 is the industry's first complete, all monolithic 6-bit digital-to-analog converter, incorporating current steering logic, current sources, diffused resistor ladder network, precision voltage reference and fast summing op amp on one chip. It combines all the desireable features of monolithic construction such as small size, light weight, low power consumption, and very high reliability – all at lower cost than discrete modules. Wide power supply range, three output voltage options, and three input code options assure flexibility for a wide variety of applications. A seventh bit may also be added for greater resolution. The monoDAC-01 is ideal for CRT deflection circuits, servo positioning controls, digitally programmed power supplies and pulse generators, modem and telephone system digitizing and demodulation circuits, digital filters, and 6-bit A/D converters

SIMPLIFIED SCHEMATIC

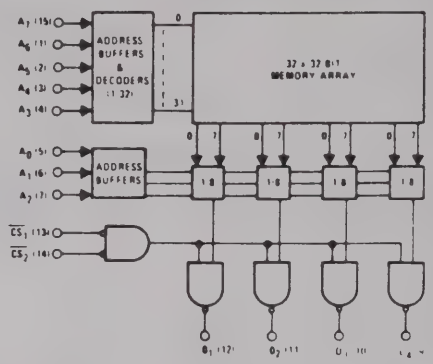


DAC01 6-Bit D/A Converter

FEATURES

- FIELD PROGRAMMABLE
- 256 4 BITS PER WORD
- FULLY DECODED
- DTL TTL COMPATIBLE
- 50ns ACCESS TIME
- PROVEN RELIABLE NICHROME FUSES
- LOW INPUT CURRENT ≤ 0.25mA
- SINGLE 5.0V POWER SUPPLY
- EXPANDABLE - "WIRED-OR" OUTPUTS WITH CHIP SELECT INPUT
- AVAILABLE IN MILITARY AND COMMERCIAL TEMPERATURE RANGES

BLOCK DIAGRAM



DESCRIPTION

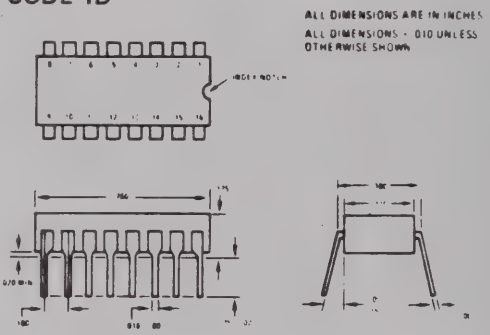
The HPROM-1024 (3-State) and the HPROM-1024A (Open Collector) are fully decoded, high speed, 1024-bit, field programmable ROM's organized as 256 words by 4 bits per word. Field programmable implies that, by following a simple programming procedure, users are able to program the PROM to any custom pattern to satisfy their system requirements.

The HPROM-1024 and the HPROM-1024A are identical except for the output stage. The HPROM-1024A has an Open Collector output while the HPROM-1024 has a third high impedance state output, allowing the device to work in a "Wire – OR" configuration. The third state is activated by disabling the device ($\overline{CS}_1$ or $\overline{CS}_2$ High).

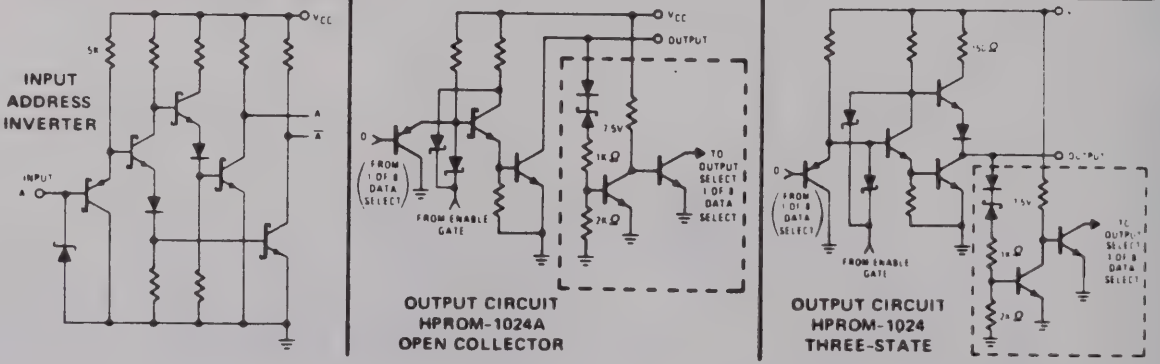
The HPROM-1024/1024A are supplied with all bits storing a Logical "1" (Output High) and can be selectively programmed for a Logical "0" (Output Low). The addressing scheme for programming and reading the information in the system is the same.

PACKAGE

CODE 1D



INPUT/OUTPUT SCHEMATICS



HPROM-1024 1024-Bit Field-Programmable ROM

FEATURES

- Switches Analog Signals up to 20 Volts Peak-to Peak
- Each Channel Complete-Interfaces with Most Integrated Logic
- Switching Speeds Less than 0.5 μs
- $I_{D(OFF)}$ Less than 500 pA Typical at 70°C
- Effective R_{ON}-5Ω to 50Ω
- Commercial and Military Temperature Range Operation

GENERAL DESCRIPTION

The IH5009 series of analog switches were designed to fill the need for an easy to-use, inexpensive switch for both industrial and military applications. Although low cost is a primary design objective (less than $1/switch in volume), performance and versatility have not been sacrificed.

Each package contains up to four channels of analog gating and is designed to eliminate the need for an external driver. The odd numbered devices are designed to be driven directly from T^2L open collector logic (15 volts) while the even numbered devices are driven directly from low level T^2L logic (5 volts). Each channel simulates a SPDT switch. SPST switch action is obtained by not connecting a reference voltage (ground) to the diode cathode. The parts are intended for high performance multiplexing and commutating usage. A logic "0" turns the channel ON and a logic "1" turns the channel OFF.

FUNCTIONAL DIAGRAM (Four Channel Switch)

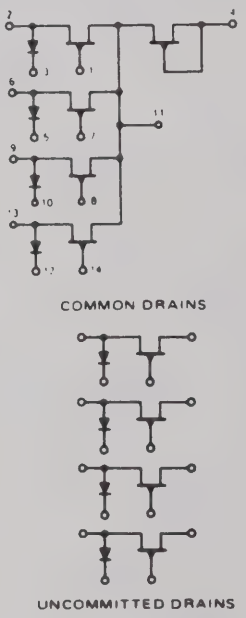


FIGURE 1

THEORY OF OPERATION

The signals seen at the drain of a junction FET type analog switch can be arbitrarily divided into two categories. Those which are less than ±200 mV, and those which are greater than ±200 mV. The former category includes all those circuits where switching is performed at the virtual ground point of an op-amp, and it is primarily towards these applications that the IH5009 family of circuits is directed.

By limiting the analog signal at the switching point to ±200 mV, no external driver is required and the need for additional power supplies is eliminated.

Devices are available with both common drains and with uncommitted drains.

Those devices which feature common drains have another FET in addition to the channel switches. This FET, which has gate and source connected such that $V_{GS} = 0$, is intended to compensate for the on-resistance of the switch. When placed in series with the feedback resistor (Figure 2) the gain is given by

$$\text{GAIN} = \frac{10\,\text{k}\Omega + R_{DS}\,(\text{compensator})}{10\,\text{k}\Omega + R_{DS}\,(\text{switch})}$$

Clearly, the gain error caused by the switch is dependent on the match between the FETs rather than the absolute value of the FET on-resistance. For the standard product,

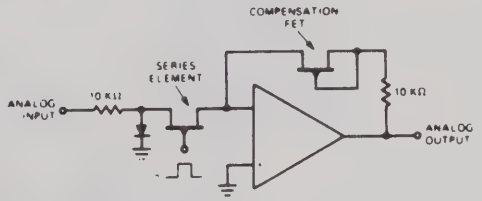


FIGURE 2 USE OF COMPENSATION FET

all the FETs in a given package are guaranteed to match within 50Ω. Selections down to 5Ω are available however. The part numbers are shown in Table II. Since the absolute value of $R_{DS(ON)}$ is only guaranteed to be less than 100Ω or 150Ω, a substantial improvement in gain accuracy can be obtained by using the compensating FET.

general description

The LH0022/LH0042/LH0052 are a family of FET input operational amplifiers with very closely matched input characteristics, very high input impedance, and ultra-low input currents with no compromise in noise, common mode rejection ratio, open loop gain, or slew rate. The internally laser nulled LH0052 offers 200 microvolts maximum offset and 5 $\mu V/^{\circ}C$ offset drift. Input offset current is less than 500 femtoamps at room temperature and 100 pA maximum at 125°C. The LH0022 and LH0042 are not internally nulled but offer comparable matching characteristics. All devices in the family are internally compensated and are free of latch-up and unusual oscillation problems. The devices may be offset nulled with a single 10k trimpot with neglible effect in CMRR.

The LH0022, LH0042 and LH0052 are specified for operation over the -55°C to +125°C military temperature range. The LH0022C, LH0042C and LH0052C are specified for operation over the -25°C to +85°C temperature range.

features

- Low input offset current – 500 femtoamps max. (LH0052)
- Low input offset drift – 5 $\mu V/^{\circ}C$ max (LH0052)
- Low input offset voltage – 100 microvolts-typ.
- High open loop gain – 100 dB typ.
- Excellent slew rate – 3.0 V/μs typ.
- Internal 6 dB/octave frequency compensation
- Pin compatible with standard IC op amps (TO-5 package)

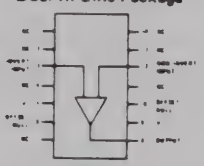
The LH0022/LH0042/LH0052 family of IC op amps are intended to fulfill a wide variety of applications for process control, medical instrumentation, and other systems requiring very low input currents and tightly matched input offsets. The LH0052 is particularly suited for long term high accuracy integrators and high accuracy sample and hold buffer amplifiers. The LH0022 and LH0042 provide low cost high performance for such applications as electrometer and photocell amplification, pico-ammeters, and high input impedance buffers.

Special electrical parameter selection and custom built circuits are available on special request.

For additional application information and information on other National operational amplifiers, see *Available Linear Applications Literature.*

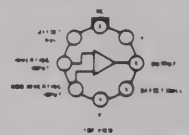
schematic and connection diagrams

Dual-In-Line Package

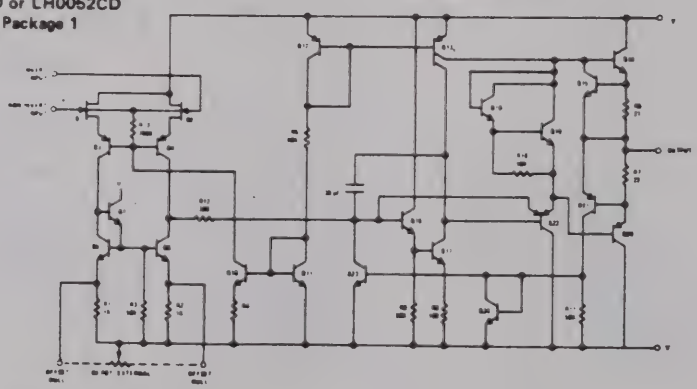


Order Number LH0022D, LH0022CD, LH0042D, LH0042CD, LH0052D or LH0052CD
See Package 1

Metal Can Package



Order Number LH0022H, LH0022CH, LH0042H, LH0042CH, LH0052H or LH0052CH
See Package 11A



*Previously Called NH0022/NH0022C

LH0022/LH0022C* high performance FET op amp
LH0042/LH0042C low cost FET op amp
LH0052/LH0052C precision FET op amp

general description

The LH0022/LH0042/LH0052 are a family of FET input operational amplifiers with very closely matched input characteristics, very high input impedance, and ultra-low input currents with no compromise in noise, common mode rejection ratio, open loop gain, or slew rate. The internally laser nulled LH0052 offers 200 microvolts maximum offset and 5 $\mu V/^{\circ}C$ offset drift. Input offset current is less than 100 femtoamps at room temperature and 100 pA maximum at 125°C. The LH0022 and LH0042 are not internally nulled but offer comparable matching characteristics. All devices in the family are internally compensated and are free of latch-up and unusual oscillation problems. The devices may be offset nulled with a single 10k trimpot with neglible effect in CMRR.

The LH0022, LH0042 and LH0052 are specified for operation over the -55°C to +125°C military temperature range. The LH0022C, LH0042C and LH0052C are specified for operation over the -25°C to +85°C temperature range.

features

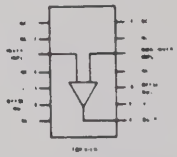
- Low input offset current – 100 femtoamps max (LH0052)
- Low input offset drift – 5 $\mu V/^{\circ}C$ max (LH0052)
- Low input offset voltage – 100 microvolts-typ
- High open loop gain – 100 dB typ.
- Excellent slew rate – 3.0 $V/\mu s$ typ
- Internal 6 dB/octave frequency compensation
- Pin compatible with standard IC op amps (TO 5 package)

The LH0022/LH0042/LH0052 family of IC op amps are intended to fulfill a wide variety of applications for process control, medical instrumentation, and other systems requiring very low input currents and tightly matched input offsets. The LH0052 is particularly suited for long term high accuracy integrators and high accuracy sample and hold buffer amplifiers. The LH0022 and LH0042 provide low cost high performance for such applications as electrometer and photocell amplification, pico-ammeters, and high input impedance buffers.

Special electrical parameter selection and custom built circuits are available on special request.

schematic and connection diagrams

Dual-In-Line Package

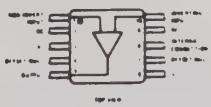


Order Number LH0022D or LH0022CD or LH0042D or LH0042CD or LH0052D or LH0052CD
See Package 1

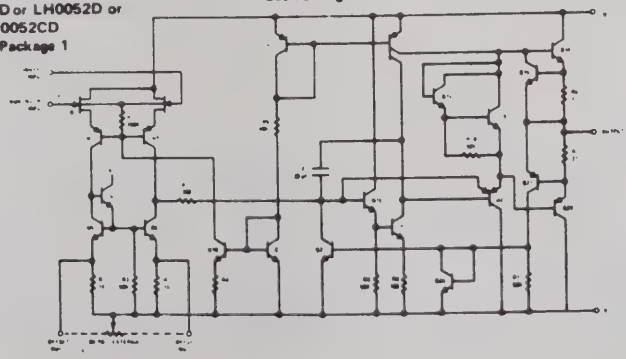
Metal Can Package

Order Number LH0022H or LH0022CH or LH0042H or LH0042CH or LH0052H or LH0052CH
See Package 9

Flat-Package



Order Number LH0022F or LH0022CF or LH0042F or LH0042CF
See Package 3



LH0052 Precision FET Operational Amplifier

LM111/LM211 voltage comparator

general description

The LM111 and LM211 are voltage comparators that have input currents nearly a thousand times lower than devices like the LM106 or LM710. They are also designed to operate over a wider range of supply voltages, from standard ±15V op amp supplies down to the single 5V supply used for IC logic. Their output is compatible with RTL, DTL and TTL as well as MOS circuits. Further, they can drive lamps or relays, switching voltages up to 50V at currents as high as 50 mA. Outstanding characteristics include

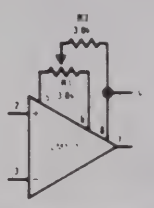
- Operates from single 5V supply
- Input current: 150 nA max. over temperature
- Offset current: 20 nA max. over temperature
- Differential input voltage range: ±30V
- Power consumption: 135 mW at ±15V

Both the inputs and the outputs of the LM111 or the LM211 can be isolated from system ground, and the output can drive loads referred to ground, the positive supply or the negative supply. Offset balancing and strobe capability are provided and outputs can be wire OR'ed. Although slower than the LM106 and LM710 (200 ns response time vs 40 ns) the devices are also much less prone to spurious oscillations. The LM111 has the same pin configuration as the LM106 and LM710.

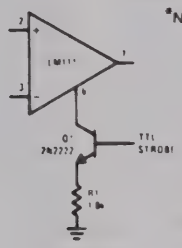
The LM211 is identical to the LM111, except that its performance is specified over a -25°C to 85°C temperature range instead of -55°C to 125°C.

auxiliary circuits*

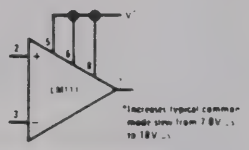
*Note: Pin connections shown on schematic diagram and typical applications are for TO-5 package.



Offset Balancing

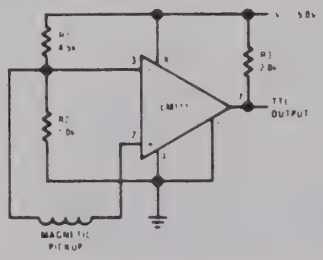


Strobing

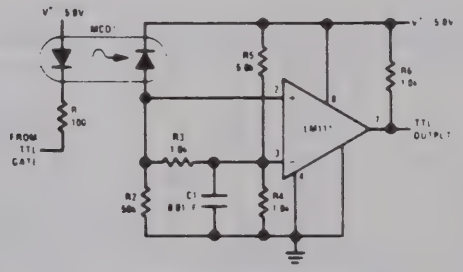


Increasing Input Stage Current*

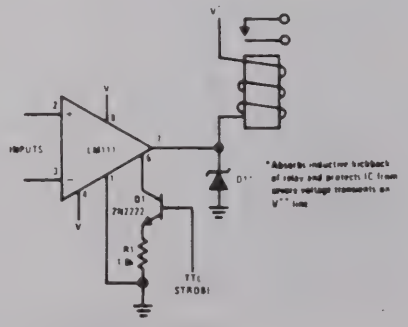
typical applications*



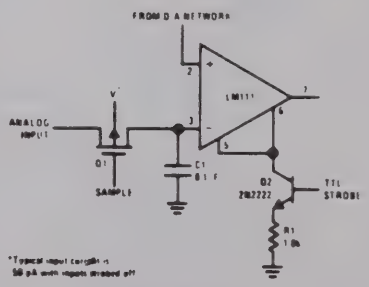
Detector for Magnetic Transducer



Digital Transmission Isolator



Relay Driver with Strob



Strobing off Both Input* and Output Stages

LM120 series three-terminal negative regulators

general description

The LM120 Series are three-terminal negative regulators with a fixed output voltage of -5V, -5.2V, -12V, and -15V and up to 1.5A load current capability. These devices need only one external component – a compensation capacitor at the output, making them easy to apply. Worst case guarantees on output voltage deviation due to any combination of line, load or temperature variation assure satisfactory system operation.

Exceptional effort has been made to make the LM120 Series immune to overload conditions. The regulators have current limiting which is independent of temperature, combined with thermal overload protection. Internal current limiting protects against momentary faults while thermal shutdown prevents junction temperatures from exceeding safe limits during prolonged overloads.

Although primarily intended for fixed output voltage applications, the LM120 Series may be programmed for higher output voltages with a simple resistive divider. The low quiescent drain current of the devices allows this technique to be used with good regulation.

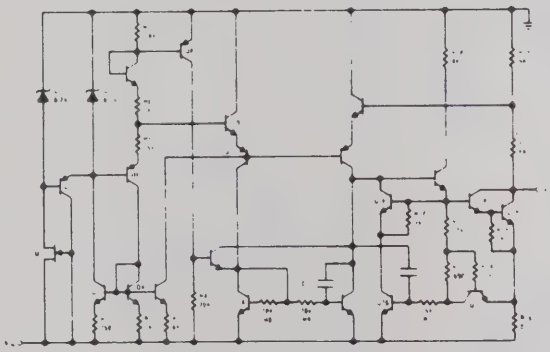
The LM120 Series is available in TO-5 and TO-3 packages. The TO-5 is rated at 200 mA and 2W, the TO-3 at 1A and 20W.

features

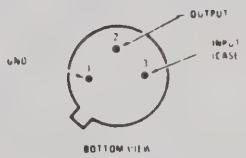
- Preset output voltage error less than ±3%
- Preset current limit
- Internal thermal shutdown
- Operates with input-output voltage differential down to 1V
- Excellent ripple rejection
- 50 mV load regulation

schematic and connection diagrams

-5V & -5.2V

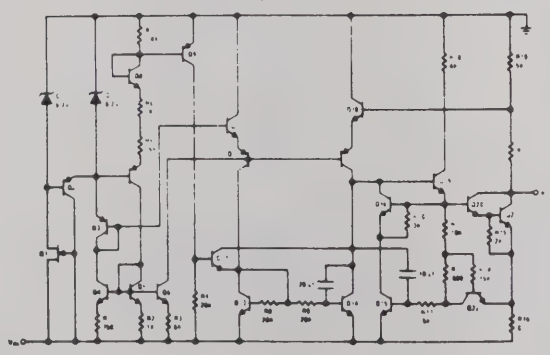


TO-5 (H)

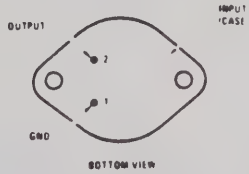


Order Numbers
LM120H-05, LM120H-5.2, LM120H-12, LM120H-15
LM220H-05, LM220H-5.2, LM220H-12, LM220H-15
LM320H-05, LM320H-5.2, LM320H-12, LM320H-15
See Package 9

-12V & -15V



TO-3 (K)



Order Numbers
LM120K-05, LM120K-5.2, LM120K-12, LM120K-15
LM220K-05, LM220K-5.2, LM220K-12, LM220K-15
LM320K-05, LM320K-5.2, LM320K-12, LM320K-15
See Package 18

LM120 3-Terminal Negative Voltage Regulator

LM741/LM741A/LM741C/LM741E operational amplifier

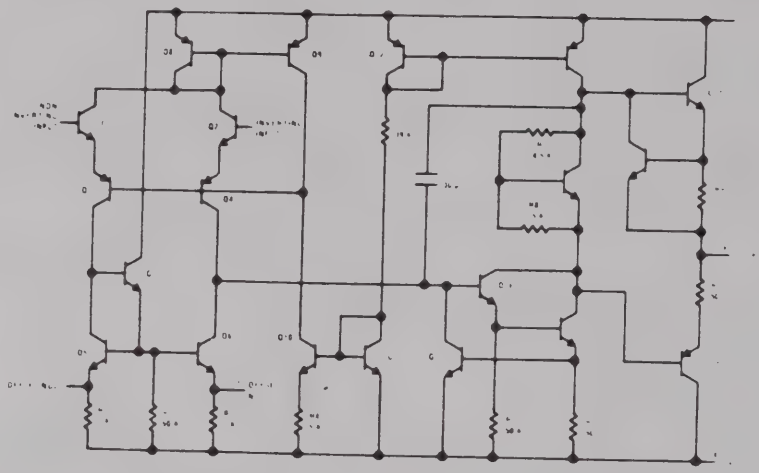
general description

The LM741 series are general purpose operational amplifiers which feature improved performance over industry standards like the LM709. They are direct, plug-in replacements for the 709C, LM201, MC1439 and 748 in most applications.

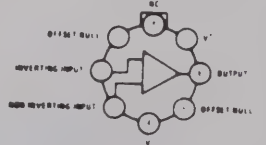
The amplifiers offer many features which make their application nearly foolproof: overload protection on the input and output, no latch-up when the common mode range is exceeded, as well as freedom from oscillations.

The LM741C/LM741E are identical to the LM741/LM741A except that the LM741C/LM741E have their performance guaranteed over a 0°C to +70°C temperature range, instead of −55°C to +125°C.

schematic and connection diagrams (Top Views)



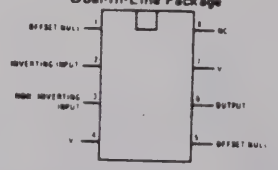
Metal Can Package



Note: Pin 4 connected to case.

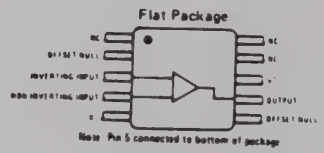
Order Number LM741H, LM741AH, LM741CH or LM741EH
See Package 11

Dual-In-Line Package



Order Number LM741CN or LM741EN
See Package 20
Order Number LM741CJ or LM741EJ
See Package 15

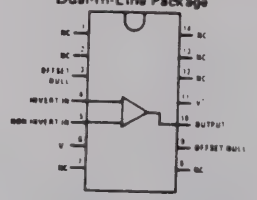
Flat Package



Note: Pin 5 connected to bottom of package.

Order Number LM741F or LM741AF
See Package 3

Dual-In-Line Package



Order Number LM741CD, LM741D, LM741AD or LM741ED
See Package 2B
Order Number LM741CN-14
See Package 22
Order Number LM741J-14, LM741AJ-14 LM741CJ-14 or LM741EJ-14
See Package 16

LM741 Operational Amplifier

SEQUENTIAL TRUTH TABLE*

INPUTS								OUTPUTS				
S1	S2	D0	D1	D2	D3	$\overline{\text{Carry In}}$	Clock **	Q0	Q1	Q2	Q3	$\overline{\text{Carry Out}}$
L	L	H	H	H	L	◊	H	H	H	H	L	H
L	H		◊	◊	◊	L	H	L	L	L	H	H
L	H		◊	◊	◊	L	H	H	L	L	H	L
L	H	◊	◊	◊	◊	L	H	L	L	L	L	H
L	H	◊	◊	◊	◊	L	H	H	L	L	L	H
L	H	◊	◊	◊	◊	H	H	H	L	L	L	H
L	H	◊	◊	◊	◊	H	H	H	L	L	L	H
H	H	◊	◊	◊	◊	H	H	H	L	L	L	H
L	H	◊	◊	◊	◊	H	H	H	L	L	L	H
H	L	◊	◊	◊	◊	L	H	L	H	L	L	H
H	L	◊	◊	◊	◊	L	H	H	L	L	L	H
H	L	◊	◊	◊	◊	L	H	L	L	L	L	L

◊ Don't care

* Truth table shows logic states assuming inputs vary in sequence shown from top to bottom

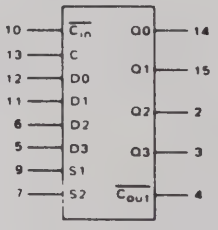
** A clock H is defined as a clock input transition from a low to a high logic level

The MC10137 is a high speed synchronous counter that can count up, count down, preset or stop count at frequencies exceeding 100 MHz. This decade counter is useful in high speed central processors and peripheral controllers, minicomputers, high speed digital communications equipment and instrumentation. The flexibility of this device allows the designer to use one basic counter for most applications. The synchronous count feature makes the MC10137 suitable for either computers or instrumentation.

Three control lines (S1, S2 and $\overline{\text{Carry In}}$) determine the operation mode of the counter. Lines S1 and S2 determine one of four operations; preset (program), increment (count up), decrement (count down) or hold (stop count). Note that in the preset mode a clock pulse is necessary to load the counter, and the information present on the data inputs (D0, D1, D2 and D3) will be entered into the counter. $\overline{\text{Carry Out}}$ goes low on the terminal count. The Carry Out on the MC10137 is partially decoded from Q1 and Q2 directly, so in the preset mode the condition of the $\overline{\text{Carry Out}}$ after the Clock's positive excursion will depend on the condition of Q1 and/or Q2.

When an output is not needed, it can be left open to conserve system power. (The open emitter output will require no power if left open.) The counter changes state only on the positive going edge of the clock. Any other input may change at any time except during the positive transition of the clock. The sequence for counting out of improper states is as shown in the State Diagrams.

A prescaler can be constructed using the MC10137 in conjunction with the MC10231 which will operate at over 200 MHz input freqency. A 500 MHz prescaler is possible using an MC1690 500 MHz D Flip Flop, an MC1670 300 MHz D Flip Flop, and the MC10137.



V_{CC1} = Pin 1
V_{CC2} = Pin 16
V_{EE} = Pin 8

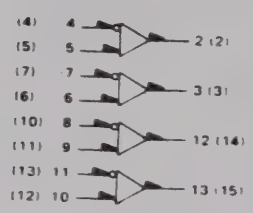
FUNCTION SELECT TABLE

S1	S2	Operating Mode
L	L	Preset (Program)
L	H	Increment (Count Up)
H	L	Decrement (Count Down)
H	H	Hold (Stop Count)

P_D = 625 mW typ/pkg (No Load)
f_{count} = 150 MHz typ

MC10137 High-Speed Synchronous Decade Counter

Four differential amplifiers with emitter followers intended for use in sensing differential signals over long lines



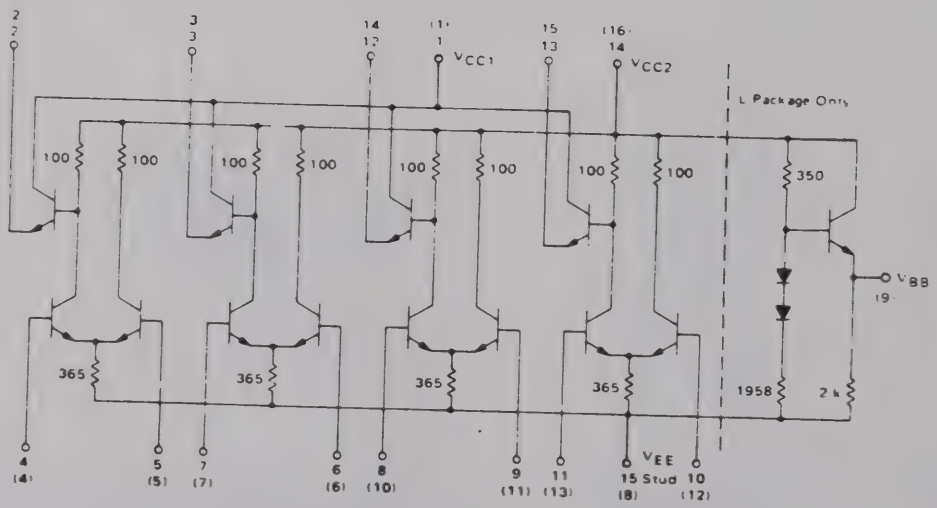
DC Input Loading Factor 1
DC Output Loading Factor 70

t_{pd} 0.9 ns typ (510 ohm load)
1.1 ns typ (50 ohm load)

P_D 220 mW typ/pkg (No load)
Full Load Current I_L -25 mAdc max

Number at end of terminals denotes pin number for S package (Case 617)
Number in parenthesis denotes pin number for L package (Case 620)

CIRCUIT SCHEMATIC



Number at end of terminal denotes pin number for S package (Case 617)
Number in parenthesis denotes pin number for L package (Case 620)

MC1692 Quad Line Receiver

DESIGN FEATURES

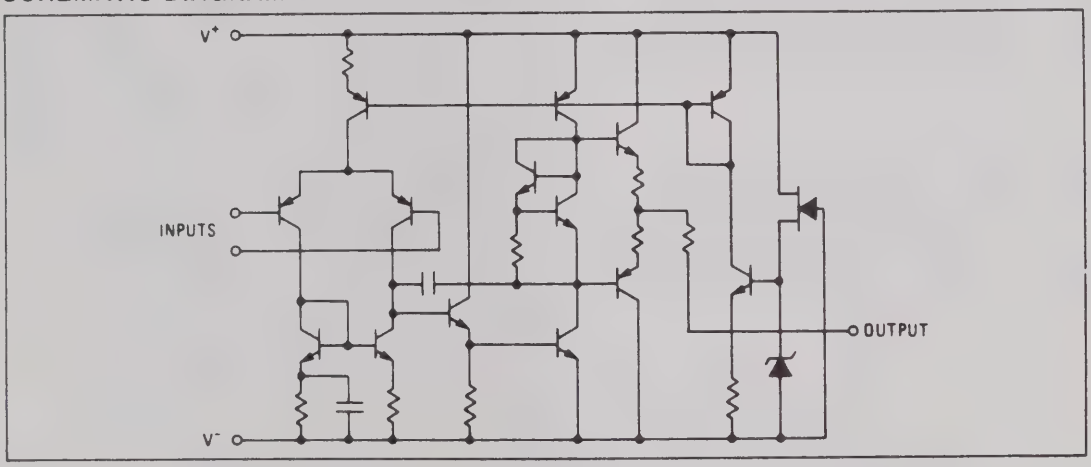
- Unity Gain Bandwidth 3MHz
- Continuous Short Circuit Protection
- No Frequency Compensation Required
- No Latch-up
- Large Common Mode and Differential Voltage Ranges
- Low Power Consumption
- Parameter Tracking Over Temperature Range
- Gain and Phase Match Between Amplifiers

The RM4136/RC4136 include four independent high gain operational amplifiers internally compensated and constructed on a single silicon chip using the planar epitaxial processes.

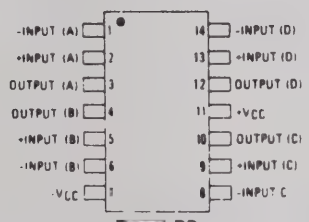
These amplifiers meet or exceed all specifications for 741 type amplifiers. Excellent channel separation allows the use of the 4136 quad amplifier in all 741 operational amplifier applications providing the highest possible packaging density.

The specially designed low noise input transistors allow the 4136 to be used in low noise signal processing applications such as audio preamplifiers and signal conditioners.

SCHEMATIC DIAGRAM



CONNECTION INFORMATION



D and DP
Dual In-line Packages
(Top View)

Order Part Nos.:
RM4136D, RC4136D,
RC4136DP

RM4136 High-Gain Operational Amplifier

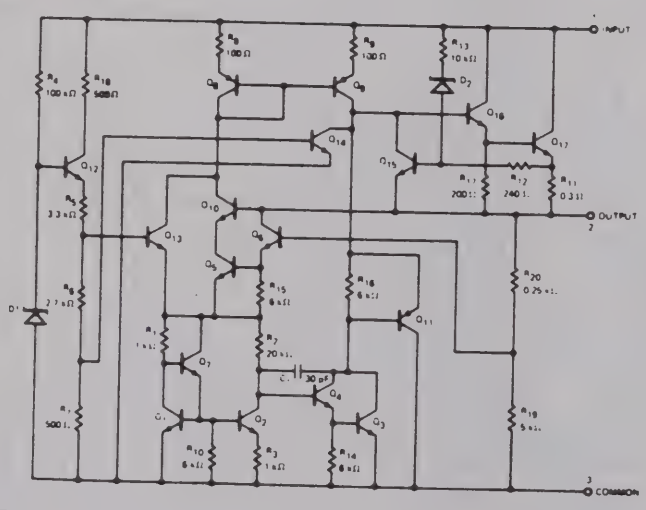
GENERAL DESCRIPTION – The μA7800 series of monolithic Three-Terminal Positive Voltage Regulators is constructed using the Fairchild Planar* epitaxial process. These regulators employ internal current limiting, thermal shutdown and safe-area compensation, making them essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. They are intended as fixed-voltage regulators in a wide range of applications including local, on-card regulation for elimination of distribution problems associated with single point regulation. In addition to use as fixed voltage regulators, these devices can be used with external components to obtain adjustable output voltages and currents and also as the power pass element in precision regulators.

- **OUTPUT CURRENT IN EXCESS OF 1 AMP**
- **NO EXTERNAL COMPONENTS**
- **INTERNAL THERMAL OVERLOAD PROTECTION**
- **INTERNAL SHORT CIRCUIT CURRENT LIMITING**
- **OUTPUT TRANSISTOR SAFE-AREA COMPENSATION**
- **AVAILABLE IN THE TO-220 AND THE TO-3 PACKAGE**
- **OUTPUT VOLTAGES OF 5, 6, 8, 12, 15, 18, AND 24 VOLTS**

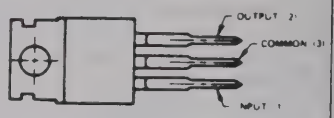
ABSOLUTE MAXIMUM RATINGS

Input Voltage (5 V through 18 V)		35 V
(24 V)		40 V
Internal Power Dissipation (Note 1)		Internally Limited
Storage Temperature Range		−65°C to +150°C
Operating Junction Temperature Range (Note 2)	7800	−55°C to +150°C
	7800C	0°C to +125°C
Lead Temperature (Soldering, 60 second time limit)	TO-3 Package	300°C
(Soldering, 10 second time limit)	TO-220 Package	230°C

EQUIVALENT CIRCUIT



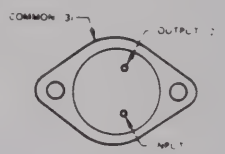
CONNECTION DIAGRAMS
TO-220 PACKAGE
(TOP VIEW)
PACKAGE OUTLINE GH



ORDER INFORMATION

OUTPUT VOLTAGE	TYPE	PART NO.
5 V	7805C	7805UC
6 V	7806C	7806UC
8 V	7808C	7808UC
12 V	7812C	7812UC
15 V	7815C	7815UC
18 V	7818C	7818UC
24 V	7824C	7824UC

TO-3 PACKAGE
(TOP VIEW)
PACKAGE OUTLINE GJ



ORDER INFORMATION

OUTPUT VOLTAGE	TYPE	PART NO.
5 V	7805	7805KM
6 V	7806	7806KM
8 V	7808	7808KM
12 V	7812	7812KM
15 V	7815	7815KM
18 V	7818	7818KM
24 V	7824	7824KM
5 V	7805C	7805KC
6 V	7806C	7806KC
8 V	7808C	7808KC
12 V	7812C	7812KC
15 V	7815C	7815KC
18 V	7818C	7818KC
24 V	7824C	7824KC

SG7812 3-Terminal Positive 12-Volt Regulator

UHF PROGRAMMABLE DIVIDERS ÷10/11

SP8640A & B 200 MHz SP8641A & B 250MHz

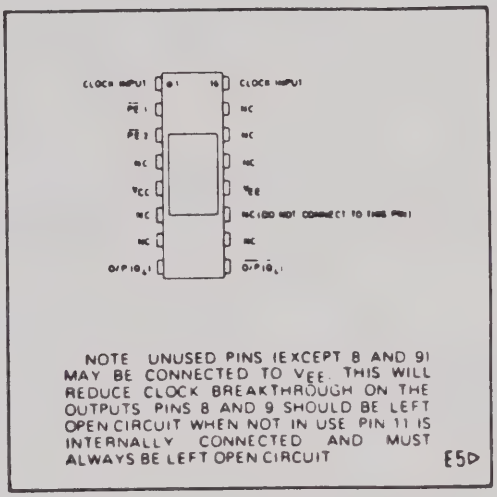
SP8642A & B 300MHz SP8643B 350MHz

In frequency synthesis it is desirable to start programmable division at as high a frequency as possible, because this raises the comparison frequency and so improves the overall synthesiser performance.

The SP8640 series are UHF integrated circuits that can be logically programmed to divide by either 10 or 11, with input frequencies up to 350 MHz. The design of very fast fully programmable dividers is therefore greatly simplified by the use of these devices and makes them particularly useful in frequency synthesisers operating in the UHF band.

All inputs and outputs are ECL-compatible throughout the temperature range: the clock inputs and programming inputs are ECL III-compatible while the two complementary outputs are ECL II-compatible to reduce power consumption in the output stage. ECL III output compatibility can be achieved very simply, however (see Operating Notes).

The division ratio is controlled by two $\overline{PE}$ inputs. The counter will divide by 10 when either $\overline{PE}$ input is in the high state and by 11 when both inputs are in the low state. Both the $\overline{PE}$ inputs and the clock inputs have nominal 4.3k Ω pulldown resistors to V_{EE} (negative rail).



NOTE UNUSED PINS (EXCEPT 8 AND 9) MAY BE CONNECTED TO V_{EE}. THIS WILL REDUCE CLOCK BREAKTHROUGH ON THE OUTPUTS. PINS 8 AND 9 SHOULD BE LEFT OPEN CIRCUIT WHEN NOT IN USE. PIN 11 IS INTERNALLY CONNECTED AND MUST ALWAYS BE LEFT OPEN CIRCUIT.

ESD

Fig. 1 Pin connections (top)

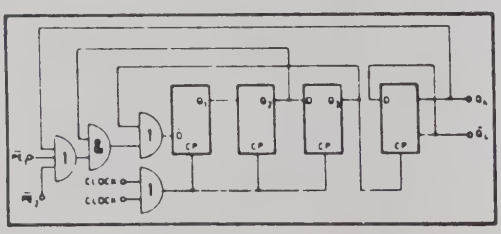


Fig. 2 Logic diagram (positive logic)

FEATURES

- Military and Industrial Variants
- 350 MHz Toggle Frequency
- Low Power Consumption
- ECL Compatibility on All I/Ps & O/Ps
- Low Propagation Delay
- True and Inverse Outputs

ABSOLUTE MAXIMUM RATINGS

Supply voltage $\lvert V_{CC} - V_{EE} \rvert$	8V
Input voltage V_{in} (d.c.)	Not greater than the supply voltage in use.
Output current I_{out}	20mA
Max. junction temperature	+150°C
Storage temperature range	−55°C to +175°C

QUICK REFERENCE DATA

- Temperature Ranges
  - 'A' Variant −55°C to +125°C
  - 'B' Variant 0°C to +70°C
- Supply Voltage
  - $\lvert V_{CC} - V_{EE} \rvert$ 5.2V
- Power Consumption 250mW Typ
- Propagation Delay 3ns Typ

APPENDIX B

ALTERNATE PERFORMANCE TEST

B.1 GENERAL.

This appendix provides alternate performance test and adjustment procedures for the R-5076/U. These procedures use the C-5320/GRD Control-Indicator (C-5320), hereinafter referred to as the C-5320, in place of the Receiver Test Set (RTS). These procedures should only be used when the RTS is not available.

NOTE

Ensure that the C-5320 used for these tests and adjustments is fully operational.

B.2 PERFORMANCE TEST.

This paragraph provides performance test procedures for the R-5076/U. The test procedures indicate if a new or repaired receiver is functioning properly.

NOTE

Table B-1 is used to confirm proper receiver operation and as a troubleshooting aid. When table B-1 is used for receiver performance confirmation, do not perform steps that require removal of receiver covers. If the receiver is operating properly, all functions can be confirmed without removing the covers.

When a receiver malfunctions, it should be tested as outlined in table B-1. The results of each test should be written down for use during the troubleshooting procedures.

B.3 ALIGNMENT AND ADJUSTMENT.

The following subparagraphs describe adjustment procedures for individual R-5076/U ECAs and CCAs. Perform these adjustments following repair of individual items before they are reassembled into a complete unit or following detection of failures during performance testing or troubleshooting. Adjustments performed after reassembly are described in paragraph B.3.2.

Table B-1. Radio Receiver R-5076/U Alternate Performance Test

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
			CAUTION Ensure that power is not applied to test equipment during test setup. AM Sensitivity Test			
1	NA	RF Signal Generator 8640B RMS Voltmeter 3400A Oscilloscope 7623A Digital Multimeter (DMM) 260 Power Supply HP 6269B Spectrum Analyzer 141T with IF plug-in 8552B and RF plug-in 8553B	Establish test setup as shown in figure B-1.			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
2	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 POWER to ON. b. Apply power to test equipment. c. On C-5320, set controls as follows: (1) Set MODE switch to AM. (2) Press SHIFT key, then 9 key. (3) Press SHIFT key, then 0 key. (4) Enter 20 on keyboard. (5) Press ENTER key. d. Set RF signal generator as follows: (1) Frequency: 20.000 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30%			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
2 (Cont)			Modulation Frequency: 1 kHz			
			e. Observe indication on the RMS voltmeter. Record level.	-10 (±5) dB	___ dB. Note dB level and proceed with step 3.	
3	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator AM switch to OFF.			
			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 2, -30 (±5) dB typical.	Proceed with step 4.	ECA A1, A2, or A3 defective.
4	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 28 on keyboard. (2) Press ENTER key.			
			b. Set RF signal generator as follows: (1) Frequency: 28.000 MHz (2) Output Level: -100 dBm			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
4 (Cont)			(3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz			
			c. Observe indication on the RMS voltmeter. Record level.	-10 (±5) dB	___ dB. Note dB level and proceed with step 5.	
5	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator AM switch to OFF.			
			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 4.	Proceed with step 6.	ECA A1, A2, or A3 defective.
6	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 35.999 on keyboard. (2) Press ENTER key. b. Set RF signal generator as follows: (1) Frequency: 35.999 MHz			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
6 (Cont)			(2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz			
			c. Observe indication on the RMS voltmeter. Record level.	-10 (±5) dB	___ dB. Note dB level and proceed with step 7.	
7	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator AM switch to OFF.			
			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 6.	Proceed with step 8.	ECA A1, A2, or A3 defective.
8	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 36 on keyboard. (2) Press ENTER key.			
			b. Set RF signal generator as follows:			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
8 (Cont)			(1) Frequency: 36.000 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz c. Observe indication on the RMS voltmeter. Record level.	-10 (±5) dB	___ dB. Note dB level and proceed with step 9.	
9	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator AM switch to OFF. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 8.	Proceed with step 10.	ECA A1, A2, or A3 defective.

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
10	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 48 on keyboard. (2) Press ENTER key. b. Set RF signal generator as follows: (1) Frequency: 48.000 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz c. Observe indication on the RMS voltmeter. Record level.	-10 (±5) dB	___ dB. Note dB level and proceed with step 11.	

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
11	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator AM switch to OFF. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 10.	Proceed with step 12.	ECA A1, A2, or A3 defective.
12	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 59.999 on keyboard. (2) Press ENTER key. b. Set RF signal generator as follows: (1) Frequency: 59.999 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
12 (Cont)			c. Observe indication on the RMS voltmeter. Record level.	-10 (±5) dB	___ dB. Note dB level and proceed with step 13.	
13	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator AM switch to OFF.			
			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 12.	Proceed with step 14.	ECA A1, A2, or A3 defective.
14	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 60 on keyboard. (2) Press ENTER key.			
			b. Set RF signal generator as follows: (1) Frequency: 60.000 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
14 (Cont)			c. Observe indication on the RMS voltmeter. Record level.	-10 (±5) dB	___ dB. Note dB level and proceed with step 15.	
15	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator AM switch OFF.			
			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 14.	Proceed with step 16.	ECA A1, A2, or A3 defective.
16	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 80 on keyboard. (2) Press ENTER key.			
			b. Set RF signal generator as follows: (1) Frequency: 80.000 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
16 (Cont)			c. Observe indication on the RMS voltmeter. Record level.	-10 (±5) dB	___ dB. Note dB level and proceed with step 17.	
17	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator AM switch to OFF.			
			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 16.	Proceed with step 18.	ECA A1, A2, or A3 defective.
18	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 99.999 on keyboard. (2) Press ENTER key.			
			b. Set RF signal generator as follows: (1) Frequency: 99.999 MHz (2) Output Level: -100 dBm			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
18 (Cont)			(3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz			
			c. Observe indication on the RMS voltmeter. Record level.	-10 (±5) dB	___ dB. Note dB level and proceed with step 19.	
19	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator AM switch to OFF.			
			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 18.	Proceed with step 20.	ECA A1, A2, or A3 defective.
20	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 100 on keyboard. (2) Press ENTER key.			
			b. Set RF signal generator as follows:			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
20 (Cont)			(1) Frequency: 100.000 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz			
			c. Observe indication on the RMS voltmeter. Record level.	-10 (±5) dB	___ dB. Note dB level and proceed with step 21.	
21	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator AM switch to OFF.			
			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 20.	Proceed with step 22.	ECA A1, A2, or A3 defective.
22	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 125 on keyboard. (2) Press ENTER key.			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
22 (Cont)			b. Set RF signal generator as follows: (1) Frequency: 125.000 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz			
			c. Observe indication on the RMS voltmeter. Record level.	-10 (±5) dB	___ dB. Note dB level and proceed with step 23.	
23	Headphone jack on receiver front panel.	Same as step 2.	a. Set RF signal generator AM switch to OFF.			
			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 22.	Proceed with step 24.	ECA A1, A2, or A3 defective.

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
24	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 149.999 on keyboard. (2) Press ENTER key. b. Set RF signal generator as follows: (1) Frequency: 149.999 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz c. Observe indication on the RMS voltmeter. Record level.	-10 (±5) dB	___ dB. Note dB level and proceed with step 25.	

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
25	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator AM switch to OFF. b. Observe RMS voltmeter indication. <u>FM Sensitivity Test</u>	>10 dB below dB level noted in step 24.	Proceed with step 26.	ECA A1, A2, or A3 defective.
26	Headphone jack on receiver front panel.	Same as step 1.	a. On C-5320, set controls as follows: (1) Set MODE switch to FM. (2) Press SHIFT push-button, then push-button. (3) Enter 50 on keyboard. (4) Press ENTER push-button. (5) Press SHIFT key, then key. (6) Enter 20 on keyboard. (7) Press ENTER key.			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
26 (Cont)			b. Set RF signal generator as follows: (1) Frequency: 20.000 MHz (2) Output Level: -110 dBm (3) Modulation: FM: INT Peak Deviation: 20 kHz Modulation Frequency: 1 kHz			
			c. Record RMS voltmeter indication.	-10 (±5) dB	___ dB. Note dB level and proceed with step 27.	
27	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator FM switch to OFF.			
			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 26.	Proceed with step 28.	ECA A1 or A3 defective.

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
28	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 28 on keyboard. (2) Press ENTER key. b. Set RF signal generator as follows: (1) Frequency: 28.000 MHz (2) Output Level: -110 dBm (3) Modulation: FM: INT Peak Deviation: 20 kHz Modulation Frequency: 1 kHz c. Record RMS voltmeter indication.	-10 (±5) dB	___ dB. Note dB level and proceed with step 29.	

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
29	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator FM switch to OFF. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 28.	Proceed with step 30.	ECA A1 or A3 defective.
30	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 35.999 on keyboard. (2) Press ENTER key. b. Set RF signal generator as follows: (1) Frequency: 35.999 MHz (2) Output Level: -110 dBm (3) Modulation: AM: INT Peak Deviation: 20 kHz Modulation Frequency: 1 kHz			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
30 (Cont)			c. Record RMS voltmeter indication.	-10 (±5) dB	___ dB. Note dB level and proceed with step 31.	
31	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator FM switch to OFF.			
			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 30.	Proceed with step 32.	ECA A1 or A3 defective.
32	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 36 on keyboard. (2) Press ENTER key.			
			b. Set RF signal generator as follows: (1) Frequency: 36.000 MHz (2) Output Level: -110 dBm (3) Modulation: FM: INT Peak Deviation: 20 kHz			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
32 (Cont)			Modulation Frequency: 1 kHz			
			c. Record RMS voltmeter indication	-10 (±5) dB	___ dB. Note dB level and proceed with step 33.	
33	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator FM switch to off.			
			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 32.	Proceed with step 34.	ECA A1 or A3 defective.
34	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 48 on keyboard. (2) Press ENTER key.			
			b. Set RF signal generator as follows: (1) Frequency: 48.000 MHz (2) Output Level: -110 dBm (3) Modulation: FM: INT			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
34 (Cont)			Peak Deviation: 20 kHz Modulation Frequency: 1 kHz			
			c. Record RMS voltmeter indication.	-10 (±5) dB	___ dB. Note dB level and proceed with step 35.	
35	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator FM switch to OFF.			
			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 34.	Proceed with step 36.	ECA A1 or A3 defective.
36	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 59.999 on keyboard. (2) Press ENTER key.			
			b. Set RF signal generator as follows: (1) Frequency: 59.999 MHz (2) Output Level: -110 dBM			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
36 (Cont)			(3) Modulation: FM: INT Peak Deviation: 20 kHz Modulation Frequency: 1 kHz			
			c. Record RMS voltmeter indication.	-10 (±5) dB	___ dB. Note dB level and proceed with step 37.	
37	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator FM switch OFF.			
			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 36.	Proceed with step 38.	ECA A1 or A3 defective.
38	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 60 on keyboard. (2) Press ENTER key.			
			b. Set RF signal generator as follows: (1) Frequency: 60.000 MHz			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
38 (Cont)			(2) Output Level: -110 dBm (3) Modulation: FM: INT Peak Deviation: 20 kHz Modulation Frequency: 1 kHz c. Record RMS voltmeter indication.	-10 (±5) dB	___ dB. Note dB level and proceed with step 39.	
39	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator FM switch to OFF. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 38.	Proceed with step 40.	ECA A1 or A3 defective.
40	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 80 on keyboard. (2) Press ENTER key. b. Set RF signal generator as follows:			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
40 (Cont)			(1) Frequency: 80.000 MHz (2) Output Level: -110 dBm (3) Modulation: FM: INT Peak Deviation: 20 kHz Modulation Frequency: 1 kHz			
			c. Record RMS voltmeter indication	-10 (±5) dB	___ dB. Note dB level and proceed with step 41.	
41	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator FM switch to OFF.			
			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 40.	Proceed with step 42.	ECA A1 or A3 defective.
42	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 99.999 on keyboard. (2) Press ENTER key.			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
42 (Cont)			b. Set RF signal generator as follows: (1) Frequency: 99.999 MHz (2) Output Level: -110 dBm (3) Modulation: FM: INT Peak Deviation: 20 kHz Modulation Frequency: 1 kHz			
			c. Record RMS voltmeter indication.	-10 (±5) dB	___ dB. Note dB level and proceed with step 43.	
43	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator FM switch to OFF.			
			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 42.	Proceed with step 44.	ECA A1 or A3 defective.

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
44	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 100 on keyboard. (2) Press ENTER key. b. Set RF signal generator as follows: (1) Frequency: 100.000 MHz (2) Output Level: -110 dBm (3) Modulation: FM: INT Peak Deviation: 20 kHz Modulation Frequency: 1 kHz c. Record RMS voltmeter indication.	-10 (±5) dB	___ dB. Note dB level and proceed with step 45.	

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
45	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator FM switch to OFF. b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 44.	Proceed with step 46.	ECA A1 or A3 defective.
46	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 125 on keyboard. (2) Press ENTER key. b. Set RF signal generator as follows: (1) Frequency: 125.000 MHz (2) Output Level: -110 dBm (3) Modulation: FM: INT Peak Deviation: 20 kHz Modulation Frequency: 1 kHz			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
46 (Cont)			c. Record RMS voltmeter indication.	-10 (±5) dB	___ dB. Note dB level and proceed with step 47.	
47	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator FM switch to OFF.			
			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 46.	Proceed with step 48.	ECA A1 or A3 defective.
48	Headphone jack on receiver front panel.	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 149.999 on keyboard. (2) Press ENTER key.			
			b. Set RF signal generator as follows: (1) Frequency: 149.999 MHz (2) Output Level: -110 dBm (3) Modulation: FM: INT Peak Deviation: 20 kHz			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
48 (Cont)			Modulation Frequency: 1 kHz			
			c. Record RMS voltmeter indication.	-10 (±5) dB	___ dB. Note dB level and proceed with step 49.	
49	Headphone jack on receiver front panel.	Same as step 1.	a. Set RF signal generator FM switch to OFF.			
			b. Observe RMS voltmeter indication.	>10 dB below dB level noted in step 48.	Proceed with step 50.	ECA A1 or A3 defective.
			IF Sensitivity Test			
50	Headphone jack on receiver front panel.	Same as step 1.	a. On C-5320, set controls as follows:			
			(1) Press CLEAR key.	>-10 dB level.		ECA A3 defective.
			(2) Press ENTER pushbutton.			
			b. Set AC POWER switch to OFF.			
			c. Set RF signal generator RF OUT switch to OFF.			
			d. Remove bottom cover from the receiver case.			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
50 (Cont)			e. Disconnect push-on coaxial cables from connector J1 on IF amplifier ECA A3. f. Connect RF signal generator to connector J1 on IF amplifier ECA A3. g. On C-5320, set controls as follows: (1) POWER switch to ON. (2) Press SHIFT key, then 9 key. (3) Press SHIFT key, than 0 key. (4) Enter 20 on keyboard. (5) Press ENTER key. (6) Set MODE switch to AM.			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
50 (Cont)			h. Set RF signal generator RF OUT switch to on. i. Set RF signal generator as follows: (1) Frequency: 10.700 MHz (2) Output Level: -80 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz j. Record RMS voltmeter indication. k. Set RF signal generator AM switch to OFF. l. Observe RMS voltmeter indicators. m. Set RF signal generator AM switch to INT.	___ dB. Note dB level and proceed with step 50k. RMS voltmeter indicates same as in step 50j.	Proceed with step 50m.	ECA A3 defective.

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
50 (Cont)			n. Set RF signal generator frequency to 30.000 MHz. o. Set DF unit controls as follows: (1) Enter 120.000 on keyboard. (2) Press ENTER pushbutton.			
			p. Repeat steps j thru l.	RMS voltmeter indicates same as in step 50j.	Proceed with step 51.	ECA A3 defective.
			<u>IF Bandwidth Select Test</u>			
51	A3-FL3, FL4, FL5	Same as step 1.	a. Set C-5320 controls as follows: (1) Press SHIFT key.		Proceed with step 51b.	
			(2) Press • key.			
			b. Connect oscilloscope to test points listed and observe voltage levels. (Refer to figure B-2 for test point locations.)	TTL low at A3-FL3. TTL high at A3-FL4 and A3-FL5.	Proceed with step 52.	ECA A2 defective.

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
52	A3-FL3, FL4, FL5	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 30 on keyboard. (2) Press ENTER key.			
			b. Connect oscilloscope to test points listed and observe voltage levels.	TTL low at A3-FL4. TTL high at A3-FL3 and A3-FL5.	Proceed with step 53.	ECA A2 defective.
53	A3-FL3, FL4, FL5	Same as step 1.	a. Set C-5320 controls as follows: (1) Enter 50 on keyboard. (2) Press ENTER key.			
			b. Connect oscilloscope to test points listed and observe voltage levels.	TTL low at A3-FL5. TTL high at A3-FL3 and A3-FL4.	Proceed with step 54.	ECA A2 defective.
			Detector Select Test			
54	A3-FL9, FL13, FL14	Same as step 1.	a. Set the C-5320 POWER switch to OFF. b. Set RF signal generator RF out switch to OFF.			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
54 (Cont)			c. Remove top and bottom covers from the receiver. d. On C-5320 set controls as follows: (1) AC POWER switch to on. (2) Press SHIFT key, then 9 key. (3) Press SHIFT key, then 0 key. e. Set RF signal generator RF OUT switch to ON. f. Connect oscilloscope to test points listed and observe voltage levels.	TTL low at A3-FL9. TTL high at A3-FL13 and A3-FL14.	Proceed with step 55.	ECA A2 defective.
55	A3-FL9, FL13, FL14	Same as step 1.	a. Set the C-5320 MODE switch to FM. b. Connect oscilloscope to test points listed and observe voltage levels.	TTL low at A3-FL14. TTL high at A3-FL9 and A3-FL13.	Proceed with step 56.	ECA A2 defective.

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
			ALC Select			
56	A3A2-E29 (R108)	Same as step 1.	a. On DF unit set controls as follows: (1) Set MODE switch to AM. (2) Enter 20 on keyboard. (3) Press ENTER key. b. Set RF signal generator as follows: (1) Frequency: 20.000 MHz (2) Output Level: -100 dBm (3) Modulation: AM: INT Modulation 0-100%: 30% Modulation Frequency: 1 kHz			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
56 (Cont)			c. Connect oscilloscope to test point and observe display (refer to figure B-3 for test point location).	1.0 (±1.0) V dc	Proceed with step 57.	ECA A3 defective.
57	A3A2-E29 (R108)	Same as step 1.	a. Set RF signal generator AM switch to off.			
			b. Observe oscilloscope.	0.3 (±0.3) V dc	Proceed with step 58.	ECA A3 defective.
			SSB/CW Test			
58	J2 of ECA A4 (using T adapter).	Same as in step 1.	a. Ensure that RF signal generator modulation is off.			
			b. Set C-5320 POWER switch to off.			
			c. Remove top cover of receiver.			
			d. On DF unit:			
			(1) Set POWER switch to ON.			
			(2) Press SHIFT key, then 9 key.			
			(3) Press SHIFT key, then 0 key.			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
58 (Cont)			(4) Press SHIFT key, then key. (5) Enter 30 on keyboard and press ENTER key. (6) Press SHIFT key. then key. (7) Enter 80 on keyboard and press ENTER key. (8) Set MODE switch to CW. e. Set RF signal generator as follows: (1) Frequency: 80.000 MHz (2) Output Level: -100 dBm (3) Modulation: OFF			
			f. Observe RMS voltmeter indication and record level.	___ dBm. Note dB level and proceed with step 58g.		
			g. Tune RF signal generator for a minimum reading on RMS voltmeter.			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
58 (Cont)			h. On C-5320: (1) Enter 79.999 on keyboard and press ENTER key. (2) Set MODE switch to LSB. (3) Adjust TUNING knob to obtain 1-kHz sinewave on oscilloscope.			
			i. Observe RMS voltmeter and record level.	___ dBm. Note dB level and proceed with step 58j.		
			j. On C-5320, enter 79.995 and press ENTER key.			
			k. Observe RMS voltmeter indication.	≥5 dBm less than reading obtained in step 58j.	Proceed with step 58l.	ECA A3 or A4 defective.
			l. Tune RF signal generator to 80.000 MHz.			
			m. Observe oscilloscope while changing tuning frequency between 80.005 and 79.995 using C-5320 keyboard. Verify correct BFO operation.	An audio sinewave varying in amplitude as the tuned frequency is changed.	Proceed with step 58m.	ECA A3 or A4 defective.

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
58 (Cont)			n. On C-5320, enter 80.000 on keyboard and press ENTER key.			
			o. Observe RMS voltmeter and record level.	___ dBm. Note dB level and proceed with step 58p.		
			p. Tune RF signal generator for a minimum reading on RMS voltmeter.			
			q. On C-5320:			
			(1) Enter 80.001 on keyboard and press ENTER key.			
			(2) Set MODE switch to USB.			
			(3) Adjust TUNING knob to obtain 1-kHz sinewave on oscilloscope.			
			r. Observe RMS voltmeter and record level.	___ dBm. Note dB level and proceed with step 58s.		
			s. On C-5320, enter 80.005 on keyboard and press ENTER key.			

Table B-1. Radio Receiver R-5076/U Alternate Performance Test (Continued)

Step	Test point	Test equipment	Procedure	Normal indication	If indication is normal	If indication is abnormal
58 (Cont)			t. Observe RMS voltmeter indication.	≥5 dBm less than reading obtained in step 58r.	Proceed with step 58u.	ECA A3 or A4 defective.
			u. Tune RF signal generator to 80.000 MHz.			
			v. On C-5320, enter 80.000 MHz and press ENTER key.			
			w. Observe oscilloscope while changing tuning frequency between 80.005 and 79.995 using C-5320 keyboard. Verify correct BFO operation.	An audio sine-wave varying in amplitude as the tuned frequency is changed.	Test is complete.	ECA A3 or A4 defective.

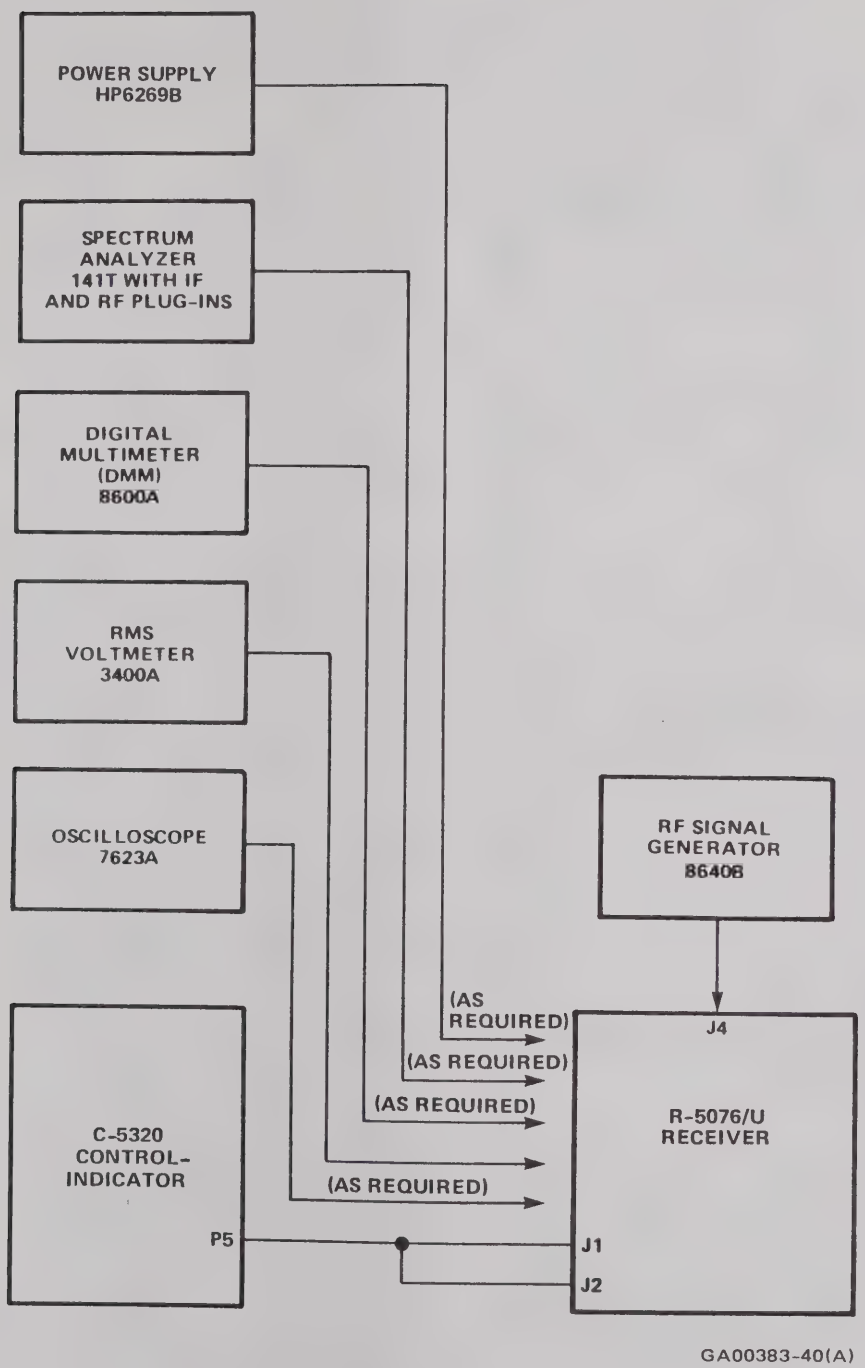


Figure B-1. Performance Test Equipment Setup

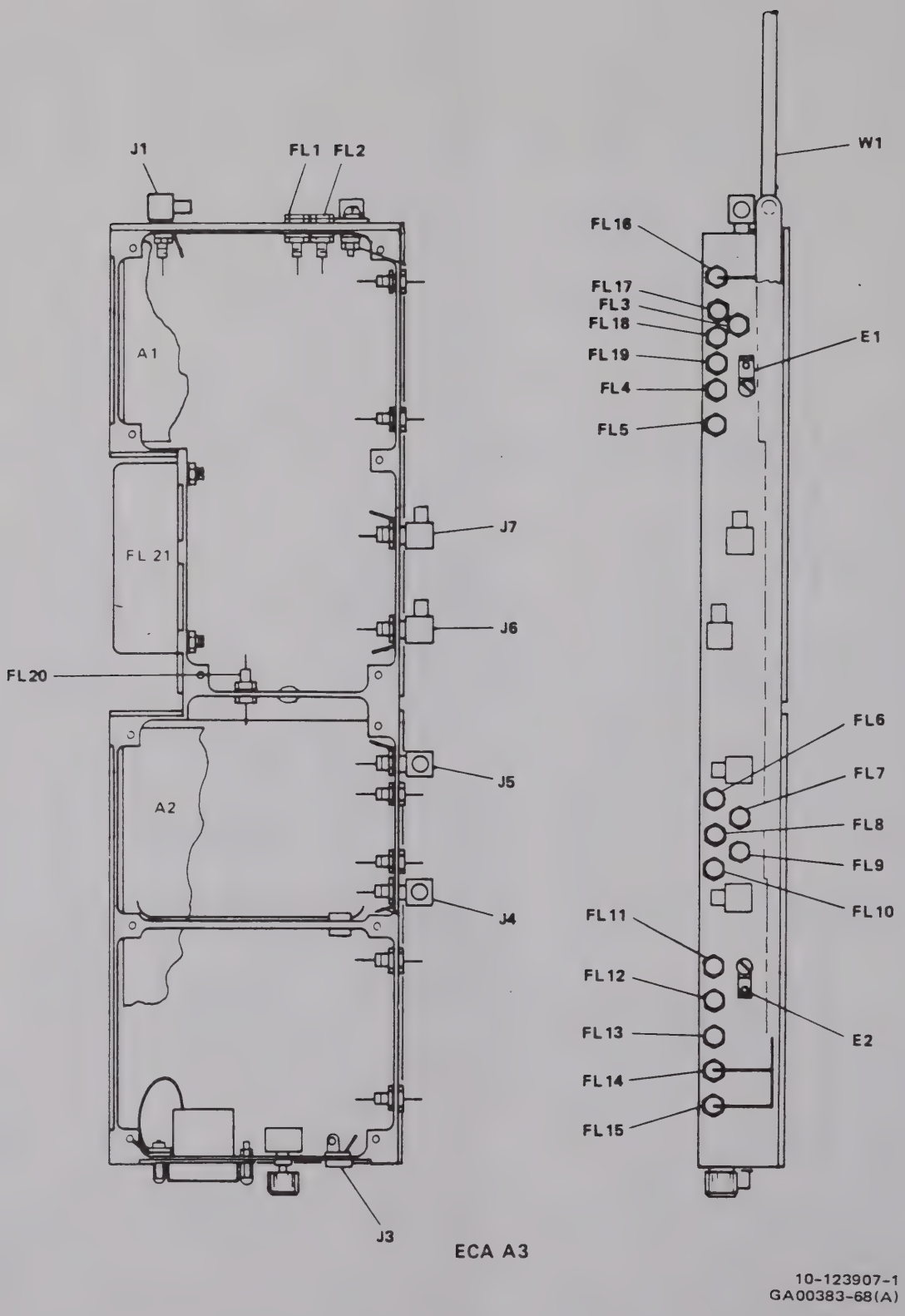


Figure B-2. First and Second IF Amplifier/Detector ECA A3 Test Point Locations (Sheet 1 of 2)

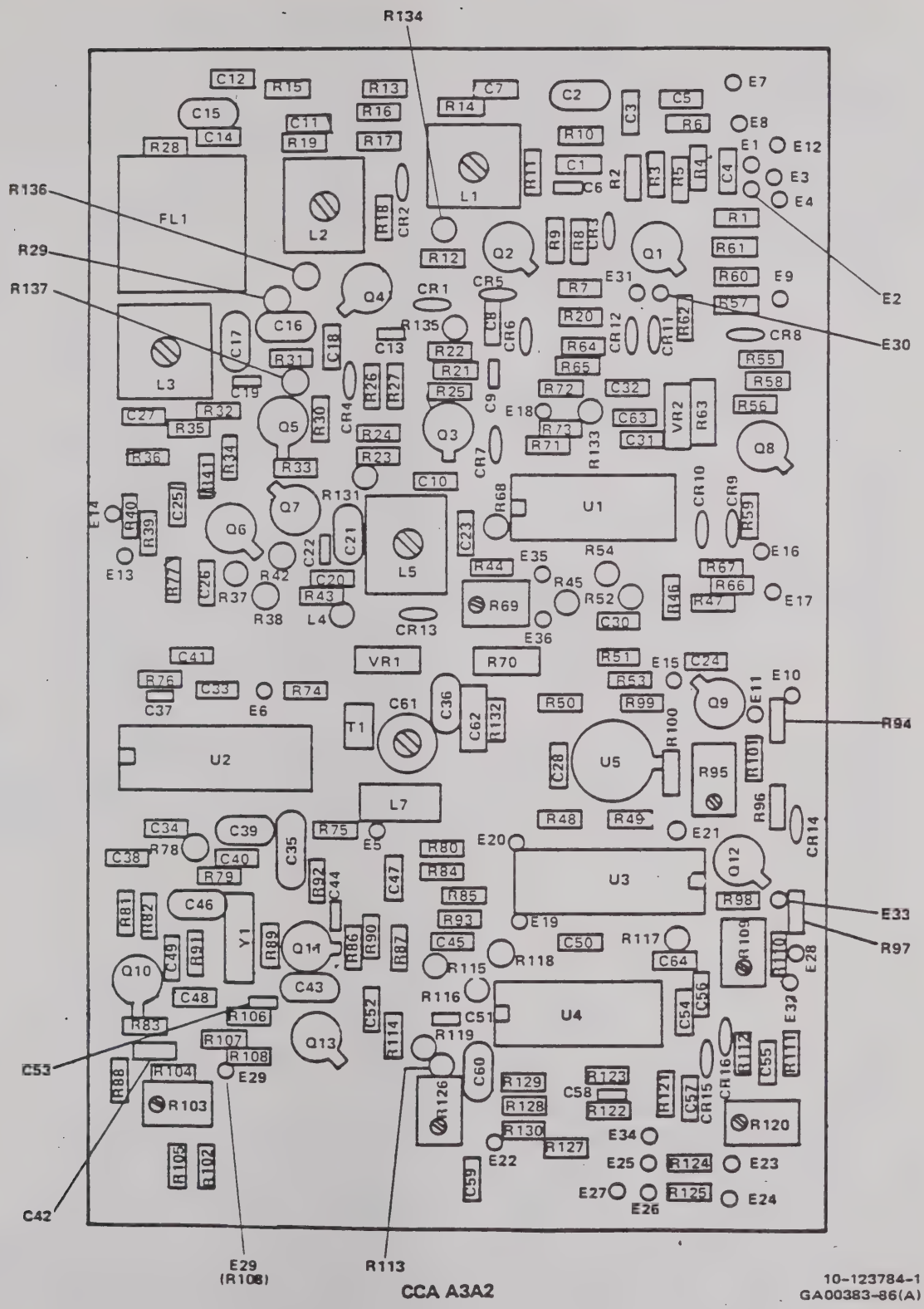


Figure B-2. First and Second IF Amplifier/Detector ECA A3 Test Point Locations (Sheet 2 of 2)

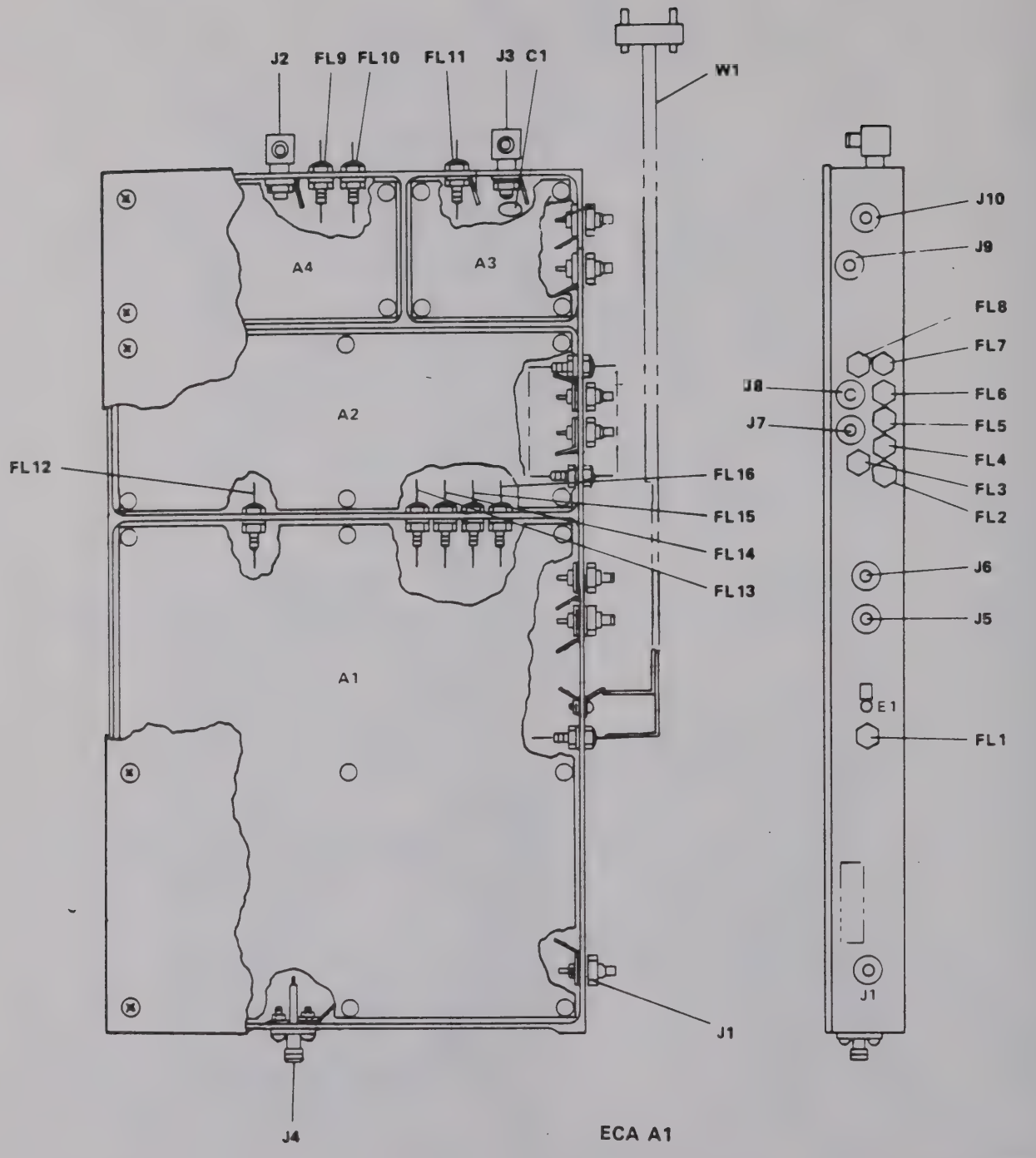


Figure B-3. Front End ECA Al Test Point Locations

B.3.1 SUBASSEMBLY ADJUSTMENT.

Adjustments described in the following subparagraphs enable the technician to set the gain and tuning of individual circuits on R-5076/U ECAs and CCAs after the unit has been disassembled (see paragraph 5.6.1). These settings are initial adjustments and may require slight changes as individual ECAs and CCAs are mated together during final assembly. If all ECAs and CCAs in a receiver undergo overhaul, perform the adjustments in the sequence presented here.

CAUTION

Before attempting adjustment of coil-tuning center slugs, use a sharp knife to cut the glyptol and conformal coating around the slugs. Failure to heed this caution may result in damage to the coil when the slug is turned.

NOTE

RF preselect CCA A1A1 and local oscillator CCA A1A2 are interdependent and must be adjusted as a unit. After completing CCA A1A1 adjustment, perform CCA A1A2 adjustment.

B.3.1.1 RF PRESELECT CCA A1A1. RF preselect CCA A1A1 consists of four voltage-tuned bandpass filters, each containing two sections. Adjustments are made by adjusting tuning slugs on iron-core coils and by adjusting the dimensions and spacing of free-standing air-core coils.

CAUTION

Ensure that power is not applied to the C-5320 during equipment setup.

NOTE

Alignment of preselect bands 1 thru 4 is outlined in the following steps. This outline should be considered only as a guide. The technician must determine what is acceptable performance since each preselect has its own minor differences. The frequency coverage of each band is the overriding concern and the tuning voltage needed to reach that goal is of little concern as long as it (TV) remains within absolute limits (0.5 to 34 V). These numbers are the approximate limits of the loop amplifier range and dictate the preselect

limit. Some leeway should be left at each end of each band for temperature effects.

a. Equipment Setup. Complete equipment setup as follows:

(1) Remove covers from the R-5076/U.

(2) Connect equipment as shown in figure B-4.

b. Equipment Control Settings. Before beginning adjustments, set equipment controls as follows:

(1) C-5320 controls:

Press SHIFT key, then 9 key.
Press SHIFT key, then 0 key.
Press SHIFT key, then • key.
Enter 08 on keyboard.
Press ENTER key.
Press SHIFT key, then • key.
Set MODE switch to FM.
Enter 36 on keyboard.
Press ENTER key.

(2) Spectrum analyzer controls:

FREQUENCY - 36.000 MHz
BANDWIDTH - 300 kHz
SCAN WIDTH - 2 MHz/div
INPUT ATTENUATION - Zero
SCAN TIME PER DIVISION - 1 MS
LOG REF LEVEL - 0 dBm
2 DB LOG/10 DB LOG/LINEAR - 10 DB LOG
LOG REF LEVEL vernier dial - Zero
VIDEO FILTER - OFF
SCAN MODE - INT
SCAN TRIGGER - AUTO

(3) RF signal generator controls:

FREQUENCY - 36.000 MHz
RF OUTPUT LEVEL - -30 dBm
Modulation - All modulation controls off
RF OUTPUT - ON

(4) Power supply controls:

Adjust power supply controls for 30.00 V dc output.

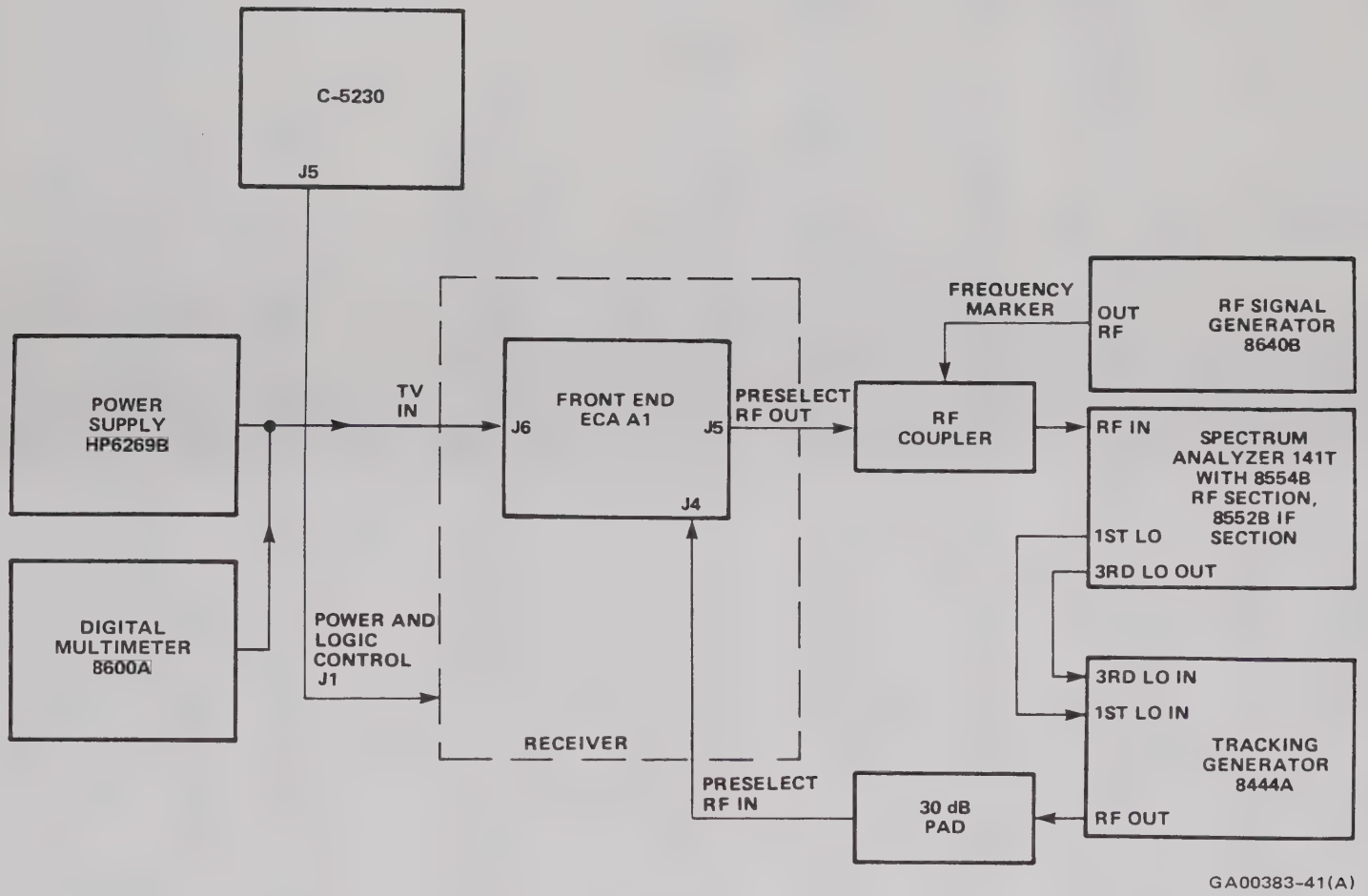


Figure B-4. RF Preselect CCA AlAl Adjustment Setup

c. Calibration of Adjustment Equipment. The tracking generator output is connected to the spectrum analyzer input port through the test cables and calibrated to establish a -30-dB reference, which includes cable losses. Perform the calibration as follows:

(1) Disconnect cables at ECA A1 J4 (input) and A1 J5 (output).

(2) Use an adapter to connect the two disconnected cable ends.

(3) Turn the tracking generator POWER switch ON and set the tracking generator LEVEL control to 0 dB. A straightline display is presented slightly below the -30-dB level on the spectrum analyzer.

(4) Adjust the spectrum analyzer FREQUENCY control to place the pip generated by the RF signal generator on the display centerline.

(5) Turn the RF signal generator RF OUTPUT switch to OFF and verify that the pip disappears. Adjust the tracking generator TRACK ADJ control to obtain the highest level on the spectrum analyzer display.

(6) Adjust the spectrum analyzer LOG REF LEVEL vernier dial to bring the display line up to -30 dB. Use this as the reference level for the following gain measurements.

CAUTION

Use only orangewood sticks and smooth-jawed long-nose pliers to adjust air-core coils. Damage to the coils is possible if other tools are used.

NOTE

Best results are obtained when the general appearance of the aligned coils is neat and orderly.

d. Band 1 Adjustments. Check band 1 to ensure that the frequency range is sufficient, the gain is proper, and the coupling is proper to obtain an acceptable bandpass. Perform adjustments by tuning coils L3, L6, L12, and L15 with center tuning slugs, and by physically adjusting coils L4, L5, and L14. See figure B-5 for coil locations on CCA A1A1.

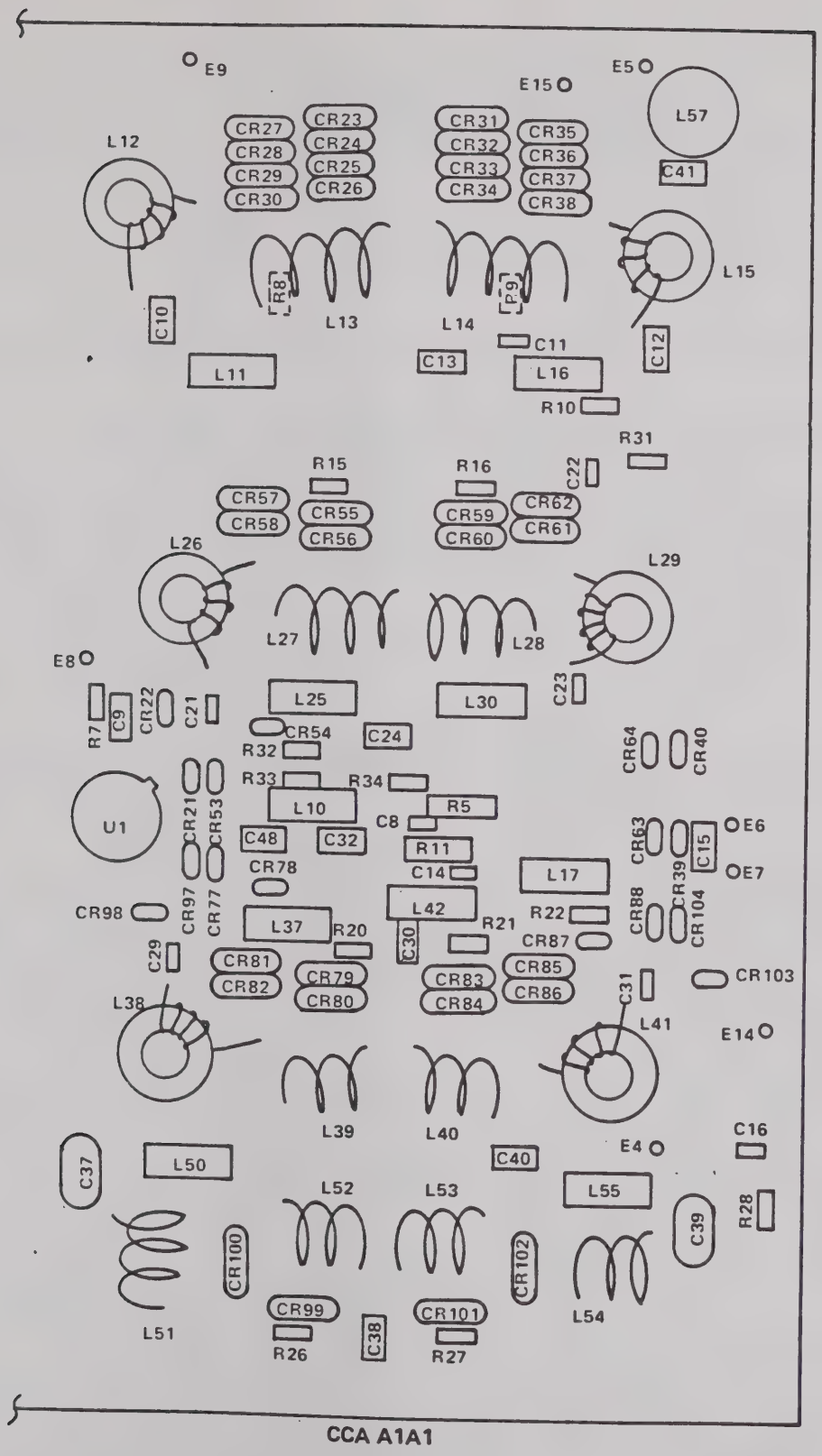


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Figure B-5. RF Preselect CCA A1A1 Adjustment Locations (Sheet 1 of 2)

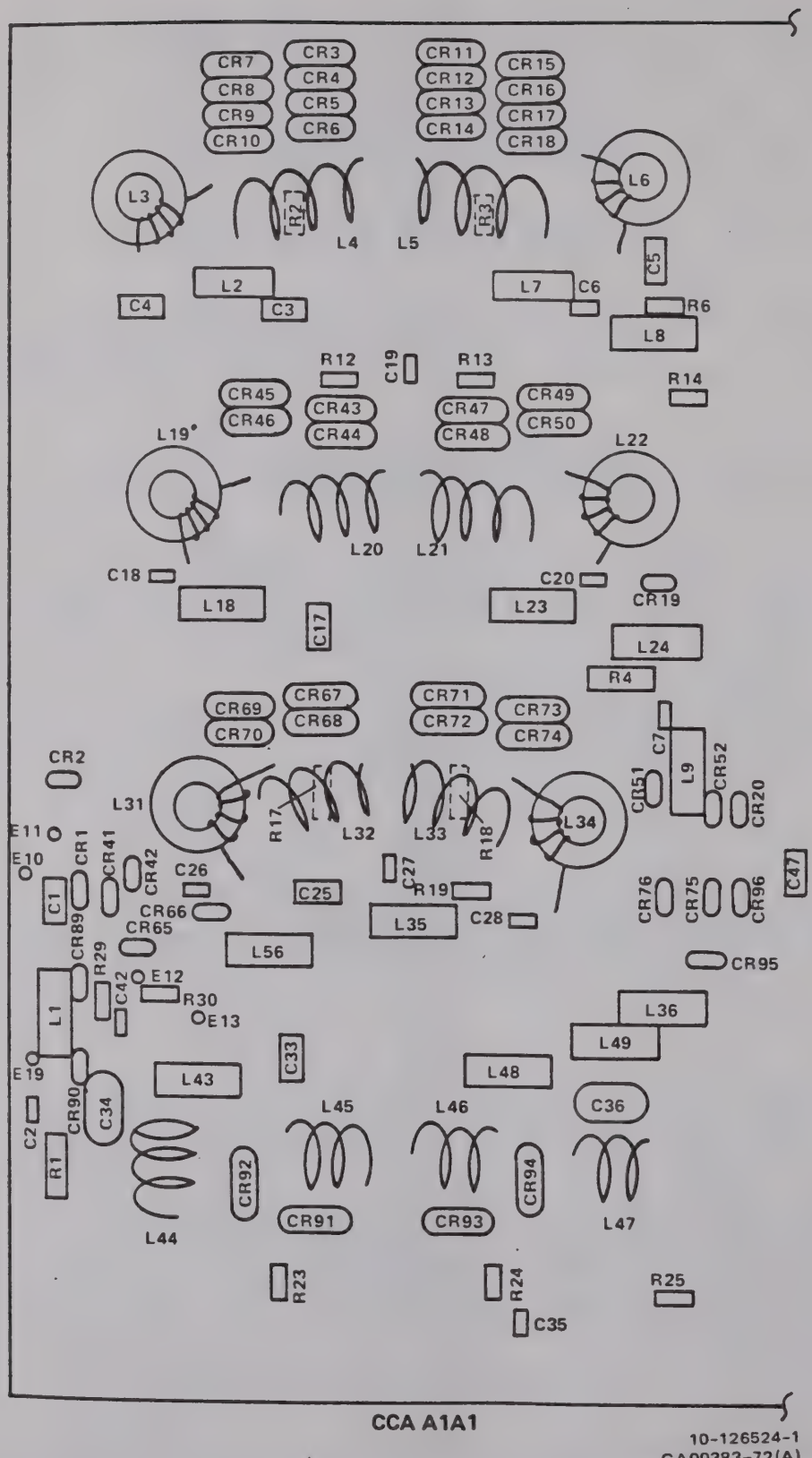


Figure B-5. RF Preselect CCA A1A1 Adjustment Locations (Sheet 2 of 2)

NOTE

Because any coil adjustments affect all three parameters (frequency range, gain, and coupling), read steps (1) thru (15), below, before starting adjustment.

(1) Reconnect the equipment setup as shown in figure B-4.

(2) Tune the RF signal generator to 36.000 MHz and turn RF signal generator RF OUTPUT switch to ON.

(3) Check the upper frequency limit by observing the RF signal generator-generated pip location in relation to the preselect output on the spectrum analyzer display. If the pip location is to the right of the output signal, the preselect is tuned lower than 36.0 MHz. Verify the power supply output is 30.0 volts. If the pip is to the left of the output signal (preselect tuned above 36.0 MHz at 30.0 tuning volts), adjust coils L3, L6, L12, and L15 with center tuning slugs, and adjust coils L4, L5, L13, and L14 to bring the upper band edge down to 36.0 MHz. Use a trial-and-error approach when tuning to the desired frequency range. (See figure B-6.)

(4) After the upper frequency limit is checked and adjusted (if necessary), check gain to ensure a maximum output level >+12 (±2) dB. Adjust L3 thru L6 and L12 thru L15 to obtain an acceptable gain.

(5) Adjust L3 thru L6 and L12 thru L15 to obtain desired bandpass shape. The optimum shape is sharply defined skirts on each side and a relatively flat peak across the top 3 dB of the display. This peak is typically 2.8 MHz wide (7.7 percent of 36 MHz). See figure B-6 for examples of desired display and out-of-tune displays.

(6) Adjust the power supply output down to approximately 2.00 V dc (whatever TV is required to tune the first band voltage-tuned filter (VTF) down to 20 MHz).

(7) Set the RF signal generator output frequency to 20 MHz for the frequency marker.

(8) Tune the spectrum analyzer to 20 MHz and center the pip (frequency marker) on the display.

(9) Check the lower frequency limit by observing the RF signal generator-generated pip location in relation to the preselect output on the spectrum analyzer display. If the pip is to the left of the output signal (preselect tuned higher than 20 MHz), adjust the power supply output downward to bring the pip onto the output signal. If the pip is to the right of the output signal the preselect is tuned below 20 MHz.

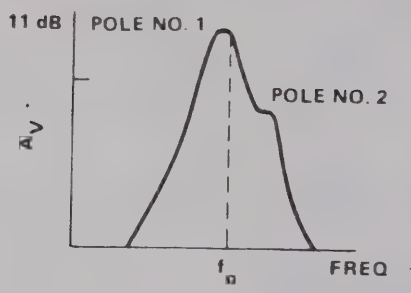
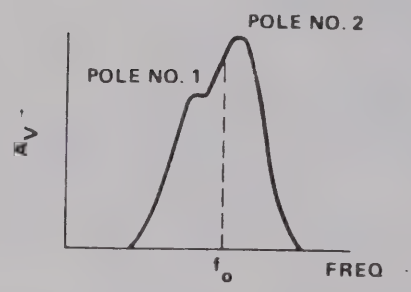
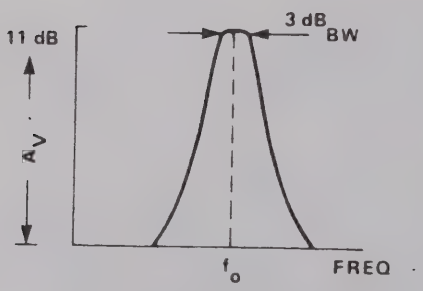
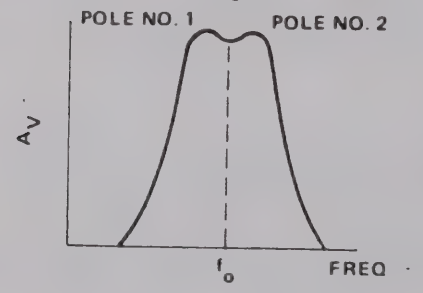
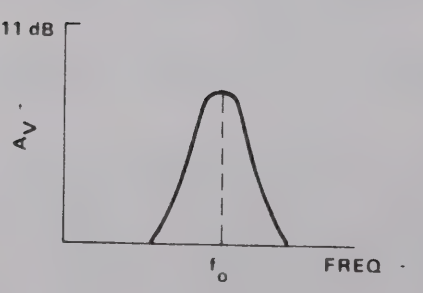
RESPONSE	SYMPTOM	CORRECTION
(a) 	POLE NO. 2 IS TOO HIGH IN FREQUENCY POLE NO. 1 IS JUST ABOUT IN ITS PROPER POSITION	FIND THE SHUNT INDUCTANCE THAT HAS THE MOST AFFECT ON POLE NO. 2 AND ADD MORE INDUCTANCE BY SQUEEZING ITS COIL WINDINGS TOGETHER.
(b) 	POLE NO. 1 IS TOO LOW IN FREQUENCY POLE NO. 2 IS JUST ABOUT IN ITS RIGHT POSITION	FIND THE SHUNT INDUCTANCE THAT HAS THE MOST AFFECT ON POLE NO. 1 AND REDUCE THE INDUCTANCE BY SPREADING ITS COIL WINDINGS APART.
(c) 	THE FREQUENCY VS. GAIN RESPONSE IS PROPER HERE	IF INCREASING OR REDUCING THE INDUCTANCES OF THE COILS TENDS TO LOWER THE GAIN, THEN THE FILTER HAS BEEN TUNED PROPERLY.
(d) 	ASSUMING THE TWO POLES ARE ON THE RIGHT FRE QUENCY, THE FILTER LOOKS OVER COUPLED	REDUCE THE COUPLING BY MOVING THE TWO SHUNT COILS APART WHILE TRYING TO MAINTAIN THE SAME INDUCTANCES.
(e) 	AGAIN ASSUMING THAT THE TWO POLES ARE ON FREQUENCY, THE FILTER LOOKS UNDER COUPLED	ADD MORE COUPLING BY MOVING THE SHUNT COILS CLOSER TOGETHER WHILE TRYING TO KEEP THE SAME INDUCTANCES.

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Figure B-6. RF Preselect CCA A1A1 Response Curves

(10) After the lower frequency is checked, check gain to ensure a minimum output level ≥+12 (±2) dB. Adjust L3 thru L6 and L12 thru L15 to obtain an acceptable gain.

(11) Adjust L3 thru L6 and L12 thru L15 as required to obtain the desired bandpass shape as shown in figure B-6. The display 3 dB BW will typically be 1.4 MHz wide (7.2 percent of 20 MHz).

(12) Set power supply output to 30.00 V dc. Tune spectrum analyzer to 60 MHz.

(13) Repeat steps (2) thru (12), above, until both ends of band 1 are properly adjusted.

(14) Set RF signal generator to 36.000 MHz.

(15) Gradually decrease power supply output setting and RF signal generator frequency while observing spectrum analyzer display. Band 1 adjustments may be considered satisfactory if the following conditions are met:

(a) The lower frequency limit (20 MHz) is tunable with 2.0 volts or greater and the upper frequency limit (36 MHz) is tunable with 30 volts.

(b) An output level ≥+12 (±2) dB is maintained throughout the frequency range. (Refer to figure B-7.)

(c) Proper bandpass shape is maintained throughout the frequency range and the bandpass peak is approximately 6 percent of the tuned frequency at 36 MHz and approximately 11 percent of the tuned frequency at 20 MHz.

e. Band 2 Adjustments. Check band 2 to ensure that the frequency range is sufficient, gain is proper, and coupling is proper to obtain an acceptable bandpass. Perform adjustment by tuning coils L19, L22, L26, and L29 with center tuning slugs, and by physically adjusting coils L20, L21, L27, and L28. See figure B-5 for coil locations on CCA A1A1.

NOTE

Because any coil adjustments affect all three parameters (frequency range, gain, and coupling), read steps (1) thru (20), below before starting adjustment.

(1) Set RF signal generator to 60.000 MHz.

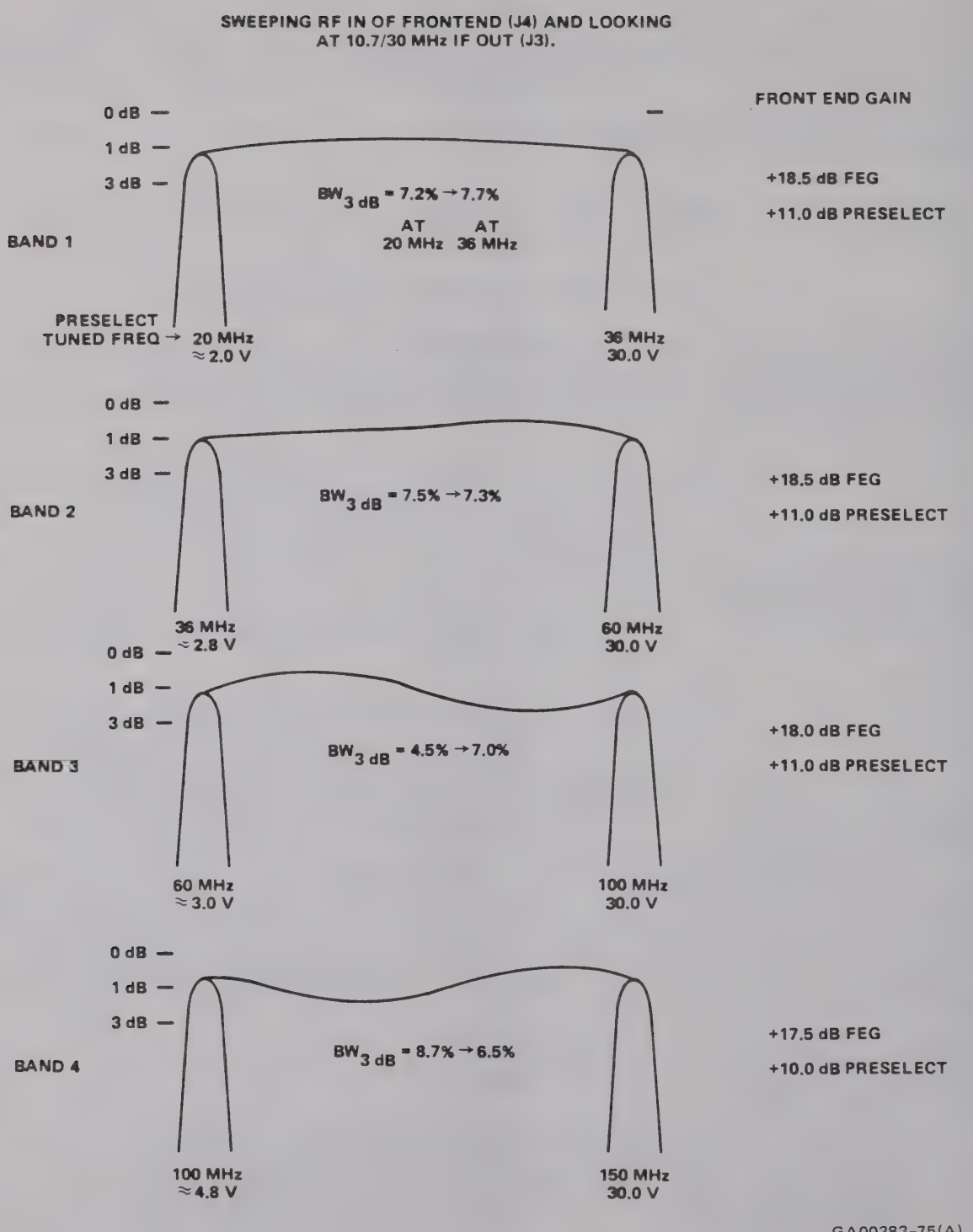

Figure B-7. Front End/Frequency Response

(2) Perform equipment calibration as described in paragraph B.3.1.1.c, above.

(3) Reconnect the equipment setup as shown in figure B-5.

(4) On C-5320, enter 60 on keyboard and press ENTER key (selects band 2 voltage tuned filter).

(5) Set power supply output to 30.00 V dc.

(6) Set RF signal generator to 60 MHz and turn RF signal generator RF OUTPUT switch to ON.

(7) Check the upper frequency limit by observing the RF signal generator-generated pip location in relation to the preselect output of the spectrum analyzer display. If the pip is to the right of the output signal the preselect is tuned lower than 60 MHz. If the pip is to the left of the output signal (preselect tuned above 60 MHz at 30.00 tuning volts), adjust L19 thru L22 and L26 thru L29 to bring the upper band edge down to 60 MHz. Use a trial-and-error approach when tuning to obtain the desired frequency range. (Refer to figure B-6.)

(8) After the upper frequency limit is checked and adjusted (if necessary), check gain to ensure a minimum output level $\geq$+12 (±2) dB. Adjust L19 thru L22 and L26 thru L29 to obtain acceptable gain.

(9) Adjust L19 thru L22 and L26 thru L29 to obtain desired bandpass shape. The optimum shape has sharply defined skirts on each side and a relatively flat peak across the top 3 dB of the display. This peak is typically 4.4 MHz wide (7.3 percent of 60 MHz). See figure B-6 for examples of the desired display and out-of-tune displays.

(10) Adjust the power supply output down to approximately 2.8 V dc (whatever TV is required to tune second band VTF down to 36 MHz).

(11) Set RF signal generator output frequency to 36 MHz for the frequency marker.

(12) Tune the spectrum analyzer to 36 MHz and center the pip (frequency marker) on the display.

(13) Check the lower frequency limit by observing the RF signal generator-generated pip location in relation to the preselect output on the spectrum analyzer display. If the pip is to the left of the output signal (preselect tuned higher than 36 MHz), adjust the power supply output downward to bring the pip onto the output signal. If the pip is to the right of the output signal the preselect is tuned below 36 MHz.

(14) After the lower frequency limit is checked, check gain to ensure a minimum output level ≥+12 (±2) dB. Adjust L19 thru L22 and L26 thru L29 to obtain acceptable gain.

(15) Adjust L19 thru L22 and L26 thru L29 as required to obtain the desired bandpass shape as shown in figure B-6. The display 3 dB BW will typically be 2.7-MHz wide (7.5 percent of 36 MHz).

(16) Tune spectrum analyzer to 60 MHz.

(17) Repeat steps (5) thru (16), above, until both ends of band 2 are properly adjusted.

(18) Set power supply output to 30.00 V dc.

(19) Set RF signal generator to 60 MHz.

(20) Gradually decrease power supply output setting and RF signal generator frequency while observing spectrum analyzer display. Band 2 adjustments may be considered satisfactory under the following conditions:

(a) The lower frequency limit (36 MHz) is tunable with 2.0 volts or greater and the upper frequency limit (60 MHz) is tunable with 30 volts.

(b) An output level ≥+12 (±2) dB is maintained throughout the frequency range. (Refer to figure B-7.)

(c) Proper bandpass shape is maintained throughout the range and the bandpass peak is approximately 7.3 percent of the tuned frequency at 60 MHz and approximately 7.5 percent of the tuned frequency at 36 MHz.

f. Band 3 Adjustments. Check band 3 to ensure that the frequency range is sufficient, gain is proper, and coupling is proper to obtain an acceptable bandpass. Perform adjustment by tuning coils L31, L34, L38, and L41 with center tuning slugs, and by physically adjusting coils L32, L33, L39, and L40. See figure B-5 for coil locations on CCA A1A1.

NOTE

Because any coil adjustments affect all three parameters (frequency range, gain, and coupling), read steps (1) thru (20), below, before starting adjustment.

(1) Set RF signal generator to 100.000 MHz.

(2) Perform equipment calibration as described in paragraph B.3.1.1.c, above.

(3) Reconnect the equipment setup as shown in figure B-4.

(4) On C-5320, enter 100 on keyboard and press ENTER key (selects band 3 voltage tuned filter).

(5) Set power supply output to 30.00 V dc.

(6) Set RF signal generator to 100 MHz and turn RF signal generator RF OUTPUT switch to ON.

(7) Check the upper frequency limit by observing the RF signal generator-generated pip location in relation to the pre-select output of the spectrum analyzer display. If the pip is to the right of the output signal the preselect is tuned lower than 100 MHz. If the pip is to the left of the output signal (preselect tuned above 100 MHz at 30.00 tuned volts), adjust L31 thru L34 and L38 thru L41 to bring the upper band edge down to 100 MHz. Use a trial-and-error approach when tuning to obtain the desired frequency range. (Refer to figure B-6.)

(8) After the upper frequency limit is checked and adjusted (if necessary), check gain to ensure a minimum output level $\geq$+12 (±2) dB. Adjust L31 thru L34 and L38 thru L41 to obtain an acceptable gain.

(9) Adjust L31 thru L34 and L38 thru L41 to obtain desired bandpass shape. The optimum shape has sharply defined skirts on each side and a relatively flat peak across the top 3 dB of the display. This peak is typically 7 MHz wide (7 percent of 100 MHz). See figure B-6 for examples of the desired display and out-of-tune displays.

(10) Adjust the power supply output down to approximately 3.0 V dc (whatever TV is required to tune third band VTF down to 60 MHz).

(11) Set RF signal generator output frequency to 60 MHz for the frequency marker.

(12) Tune the spectrum analyzer to 60 MHz and center the pip (frequency marker) on the display.

(13) Check the lower frequency limit by observing the RF signal generator-generated pip location in relation to the pre-select output on the spectrum analyzer display. If the pip is to the left the output signal (preselect tuned higher than 60 MHz), adjust the power supply output downward to bring the pip onto the output signal. If the pip is to the right of the output signal the preselect is tuned below 60 MHz.

(14) After the lower frequency limit is checked, check gain to ensure a minimum output level ≥+12 (±2) dB. Adjust L31 thru L34 and L38 thru L41 to obtain acceptable gain.

(15) Adjust L31 thru L34 and L38 to L41 as required to obtain the desired bandpass shape as shown in figure B-6. The display peak 3 dB BW will typically be 4.5 MHz wide (7.5 percent of 60 MHz).

(16) Tune spectrum analyzer to 100 MHz.

(17) Repeat steps (5) thru (16), above, until both ends of band 3 are properly adjusted.

(18) Set power supply output to 30.00 V dc.

(19) Set RF signal generator to 100 MHz.

(20) Gradually decrease power supply output setting and RF signal generator frequency while observing spectrum analyzer display. Band 3 adjustments may be considered satisfactory under the following conditions:

(a) The lower frequency limit (60 MHz) is tunable with 2.0 volts or greater and the upper frequency limit (100 MHz) is tunable with 30 volts.

(b) An output level ≥+12 (±2) dB is maintained throughout the range. (Refer to figure B-7.)

(c) Proper bandpass shape is maintained throughout the range and the bandpass peak is approximately 7 percent of the tuned frequency at 100 MHz and approximately 7.5 percent of the tuned frequency at 60 MHz.

g. Band 4 Adjustments. Check band 4 to ensure that the frequency range is sufficient, gain is proper, and coupling is proper to obtain an acceptable bandpass. Perform adjustment of coils L44 thru L47 and L51 thru L54 by physically adjusting coils. See figure B-5 for coil locations on CCA A1A1.

NOTE

Because any coil adjustments affect all three parameters (frequency range, gain, and coupling), read steps (1) thru (20), below, before starting adjustment.

(1) Set RF signal generator to 150.000 MHz.

(2) Perform equipment calibration as described in paragraph B.3.1.1.c, above.

(3) Reconnect the equipment setup as shown in figure B-4.

(4) On C-5320, enter 150 on keyboard and press ENTER key (selects band 4 voltage tuned filter).

(5) Set power supply output to 30.00 V dc.

(6) Set RF signal generator to 150 MHz and turn RF signal generator RF OUTPUT switch to ON.

(7) Check the upper frequency limit by observing the RF signal generator-generated pip location in relation to the preselect output of the spectrum analyzer display. If the pip is to the right of the output signal, the preselect is tuned lower than 150 MHz. If the pip is to the left of the output signal (preselect tuned above 150 MHz at 30.00 tuning volts), adjust L44 thru L47 and L51 thru L54 to bring the upper band edge down to 150 MHz. Use a trial-and-error approach when tuning to obtain the desired frequency range. (Refer to figure B-6.)

(8) After the upper frequency limit is checked and adjusted (if necessary), check gain to ensure a minimum output level $\geq$+12 (±2) dB. Adjust L44 thru L47 and L51 thru L54 to obtain an acceptable gain.

(9) Adjust L44 thru L47 and L51 thru L54 to obtain desired bandpass shape. The optimum shape has sharply defined skirts on each side and a relatively flat peak across the top 3 dB of the display. This peak is typically 9.8 MHz wide (6.5 percent of 150 MHz). See figure B-6 for examples of the desired display and out-of-tune displays.

(10) Adjust the power supply output down to approximately 4.8 V dc (whatever TV is required to tune fourth band VTF down to 100 MHz).

(11) Set RF signal generator output frequency to 100 MHz for the frequency marker.

(12) Tune the spectrum analyzer to 100 MHz and center the pip (frequency marker) on the display.

(13) Check the lower frequency limit by observing the RF signal generator-generated pip location in relation to the preselect output on the spectrum analyzer display. If the pip is to the left of the output signal (preselect tuned higher than 100 MHz), adjust the power supply output downward to bring the pip onto the output signal. If the pip is to the right of the output signal, the preselect is tuned below 100 MHz.

(14) After the lower frequency range is checked, check gain to ensure a minimum output level ≥+12 (±2) dB. Adjust L44 thru L47 and L51 thru L54 to obtain acceptable gain.

(15) Adjust L44 thru L47 and L51 thru L54 as required to obtain the desired bandpass shape as shown in figure B-6. The display peak 3 dB BW will typically be 8.7 MHz wide (8.7 percent of 100 MHz).

(16) Tune spectrum analyzer to 150 MHz.

(17) Repeat steps (5) thru (16), above, until both ends of band 4 are properly adjusted.

(18) Set power supply output to 30.00 V dc.

(19) Set RF signal generator to 150 MHz.

(20) Gradually decrease power supply output setting and RF signal generator frequency while observing spectrum analyzer display. Band 4 adjustments may be considered satisfactory under the following conditions:

(a) The lower frequency limit (100 MHz) is tunable with 2.0 volts or greater, and the upper frequency limit (150 MHz) is tunable with 30 volts.

(b) An output level ≥+12 (±2) dB is maintained throughout the range. (Refer to figure B-7.)

(c) Proper bandpass shape is maintained throughout the range, and the bandpass peak is approximately 8.7 percent of the tuned frequency at 100 MHz and 6.5 percent of the tuned frequency at 150 MHz.

B.3.1.2 LOCAL OSCILLATOR CCA A1A2. Local oscillator CCA A1A2 contains five local oscillator (LO) circuits, one for each of the five preselector bands. The LO circuits are first tuned to the lower and upper band edge frequencies within the synthesizer tuning voltage range. The test setup is then changed to match the LO output against the preselect tuning voltage response.

CAUTION

Ensure that power is not applied to the C-5320 during equipment setup.

NOTE

If a failure occurs in either preselect CCA A1A1 or local oscillator (LO) CCA A1A2 that requires changing a varactor, it may be necessary to retrack the preselect to the LO. If the characteristics of the new component differ much from the old component, then the tracking procedure listed below will not be able to compensate for the change. When this happens, the LO will appear to tune slower or faster than the preselect. To correct this, the coupling capacitor between the varactors and the transformer of the individual LO circuits must be "factory selected." A larger capacitor will make the LO tune faster in relationship to the preselect. Therefore, a smaller capacitor will make the LO tune slower. The coupling capacitor for each LO band is as follows:

Band 1 - C2
Band 2 - C8
Band 3 - C14
Band 4 - C20

Trial and error will accomplish this task. The value of the capacitor will change less than 15 percent.

a. Equipment Setup. Complete equipment setup as follows:

(1) Remove covers from the R-5076/U.

(2) Connect equipment as shown in figure B-8.

(3) Connect a test cable from A1J7 to the RF signal generator COUNTER INPUT.

b. Equipment Control Settings. Before beginning adjustments, set equipment controls as follows:

(1) C-5320 controls:

Enter 20 on keyboard.

Press ENTER key.

(2) Spectrum analyzer controls:

FREQUENCY - 46.700 MHz
BANDWIDTH - 300 kHz
SCAN WIDTH - 2 MHz/div
INPUT ATTENUATION - 20 dB
SCAN TIME PER DIVISION - 1 Ms

LOG REF LEVEL - 0 dBm
2 DB LOG/10 DB LOG/LINEAR - 10 DB LOG
LOG REF LEVEL vernier dial - 0 dB
VIDEO FILTERS - OFF
SCAN MODE - INT
SCAN TRIGGER - AUTO

(3) RF signal generator controls:

FREQUENCY - does not matter
RF OUTPUT LEVEL - -130 dBm
Modulation - All modulation controls off
RF OUTPUT - OFF
COUNTER MODE INT/EXT - EXT

(4) Power supply controls:

Set power supply output to 30.00 V dc.

CAUTION

Use only orangewood sticks and smooth-jawed long-nose pliers to adjust air-core coils. Damage to the coils is possible if other tools are used.

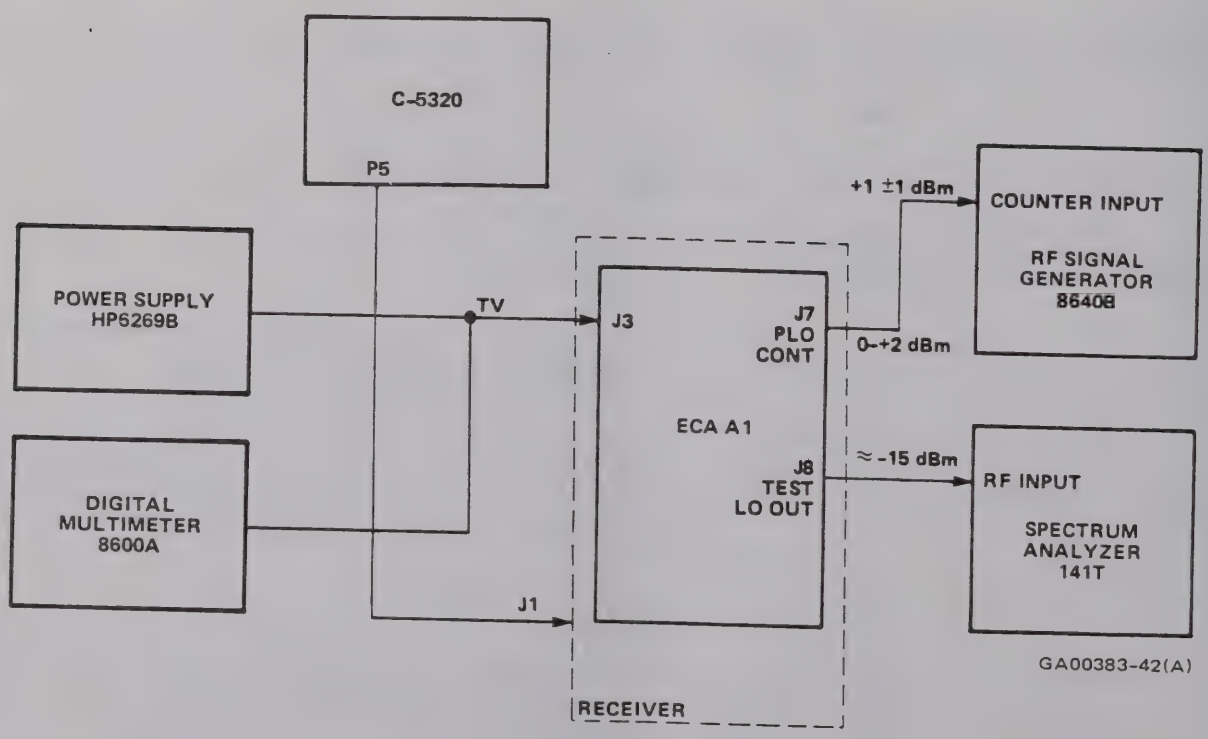

Figure B-8. LO CCA A1A2 Preliminary Adjustment Setup

NOTE

Best results are obtained when the general appearance of the aligned coils is neat and orderly.

c. Band 1 Adjustment. Adjust the band 1 and band 2 LO to ensure that it produces an output 10.7 MHz above the preselect band edge frequency at both the lower and upper band edges. These settings are preliminary and will be adjusted later to coincide with the preselect responses at the same tuning voltage. See figure B-9 for component locations.

(1) Set power supply output to 30.00 V dc.

(2) Adjust A1A2 T1 to obtain 46.7 MHz on the RF signal generator COUNTER display.

(3) Set power supply output to the tuning voltage required to tune preselector to 20 MHz in band 1.

(4) Select a capacitance value for A1A2 C2 to obtain 30.7 MHz on the RF signal generator COUNTER display.

CAUTION

Q1 thru Q4 are field effect transistors. Work on these devices requires static sensitive handling techniques.

(5) Repeat steps (1) thru (4), above, until both upper and lower frequency requirements are satisfied.

(6) Using the spectrum analyzer RF INPUT verify that the LO output amplitudes are as indicated in figure B-8 and that any spikes or spurs are 90 dB or more below the LO signal peak.

d. Band 2 Adjustment. See figure B-9 for component locations.

(1) On C-5320, enter 36 on keyboard and press ENTER key (selects band 2).

(2) Set power supply output to 30.00 V dc.

(3) Adjust A1A2 T2 for 70.7 MHz on the RF signal generator COUNTER display.

(4) Set power supply output to the tuning voltage required to tune preselector to 36 MHz in band 2.

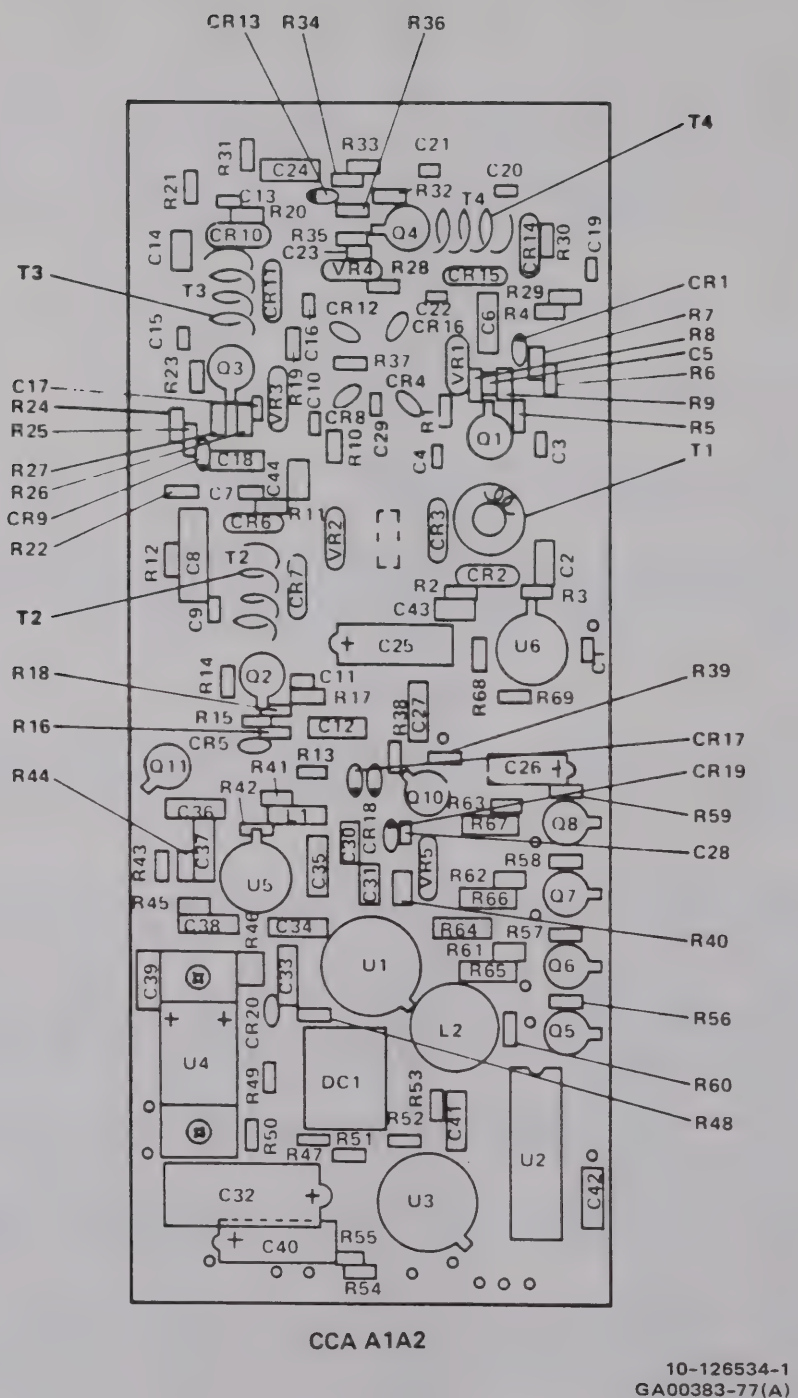

Figure B-9. Local Oscillator CCA A1A2 Adjustment Locations

(5) Select a capacitance for A1A2 C8 for 46.7 MHz on the RF signal generator COUNTER display.

(6) Repeat steps (2) thru (5), above, until both upper and lower frequency requirements are satisfied.

(7) Using the spectrum analyzer RF INPUT, verify that the LO output amplitudes are as indicated in figure B-6 and that any spikes or spurs are 90 dB or more below the LO signal peak.

e. Band 3 Adjustment. Adjust the band 3 and 4 LO to ensure that it produces an output 30 MHz above the preselect band edge frequency at both the lower and upper band edges. These settings are preliminary and will be adjusted later to coincide with the preselect responses at the same tuning voltage. See figure B-9 for component locations.

(1) On C-5320, enter 60 on keyboard and press ENTER key (selects band 3).

(2) Set power supply output to 30.00 V dc.

(3) Adjust A1A2 T3 for 130 MHz on the RF signal generator COUNTER display.

(4) Set power supply output to the tuning voltage required to tune preselector to 60 MHz in band 3.

(5) Select a capacitance value for A1A2 C14 for 90 MHz on the RF signal generator COUNTER display.

(6) Repeat steps (2) thru (5), above, until both upper and lower frequency requirements are satisfied.

(7) Using the spectrum analyzer RF INPUT, verify that the LO output amplitudes are as indicated in figure B-8 and that any spikes or spurs are 90 dB or more below the LO signal peak.

f. Band 4 Adjustment. See figure B-9 for component locations.

(1) On C-5320, enter 100 on keyboard and press ENTER key (selects band 4).

(2) Set power supply output to 30.00 V dc.

(3) Adjust A1A2 T4 for 180 MHz on the RF signal generator COUNTER display.

(4) Set power supply output to the tuning voltage required to tune preselector to 100 MHz in band 4.

(5) Select a capacitance for A1A2 C20 for 130 MHz on the RF signal generator COUNTER display.

(6) Repeat steps (2) thru (5), above, until both upper and lower frequency requirements are satisfied.

(7) Using the spectrum analyzer RF INPUT verify that the LO output amplitudes are as indicated in figure B-6 and that any spikes or spurs are 90 dB or more below the LO signal peak.

g. Band 1 LO Tracking Adjustments.

(1) Connect equipment as shown in figure B-10.

(2) Disconnect the RF coupler from the spectrum analyzer RF INPUT and move the RF signal generator output from the mixer to the spectrum analyzer RF INPUT port.

(3) Set RF signal generator frequency to 36.000 MHz and move RF OUT switch to ON. Center and stabilize 36-MHz signal on the spectrum analyzer display.

(4) Reconnect the equipment as shown in figure B-10.

(5) Set RF signal generator frequency to 10.700 MHz.

(6) Set power supply output to 30.00 V dc.

(7) On C-5320, enter 20 on keyboard and press ENTER key (selects band 1).

(8) Adjust A1A2 T1 to bring LO output spike up onto the peak of preselect output signal. See figure B-11 for display examples.

(9) After centering LO output on preselect output, gradually decrease power supply output while tracking preselect/LO output display on the spectrum analyzer. Verify that LO output remains on top of preselect output throughout the band 1 range (20 to 36 MHz). LO output must appear on or above -1 dB point on preselect output signal.

h. Band 2 LO Tracking Adjustments.

(1) Disconnect the RF coupler from the spectrum analyzer RF INPUT and move the RF signal generator output from the mixer to the spectrum analyzer RF INPUT port.

(2) Set RF signal generator frequency to 60.000 MHz. Center and stabilize 60 MHz signal on the spectrum analyzer display.

(3) Reconnect the equipment setup as shown in figure B-10.

(4) Set RF signal generator frequency to 10.7 MHz.

(5) Set power supply output to 30.00 V dc.

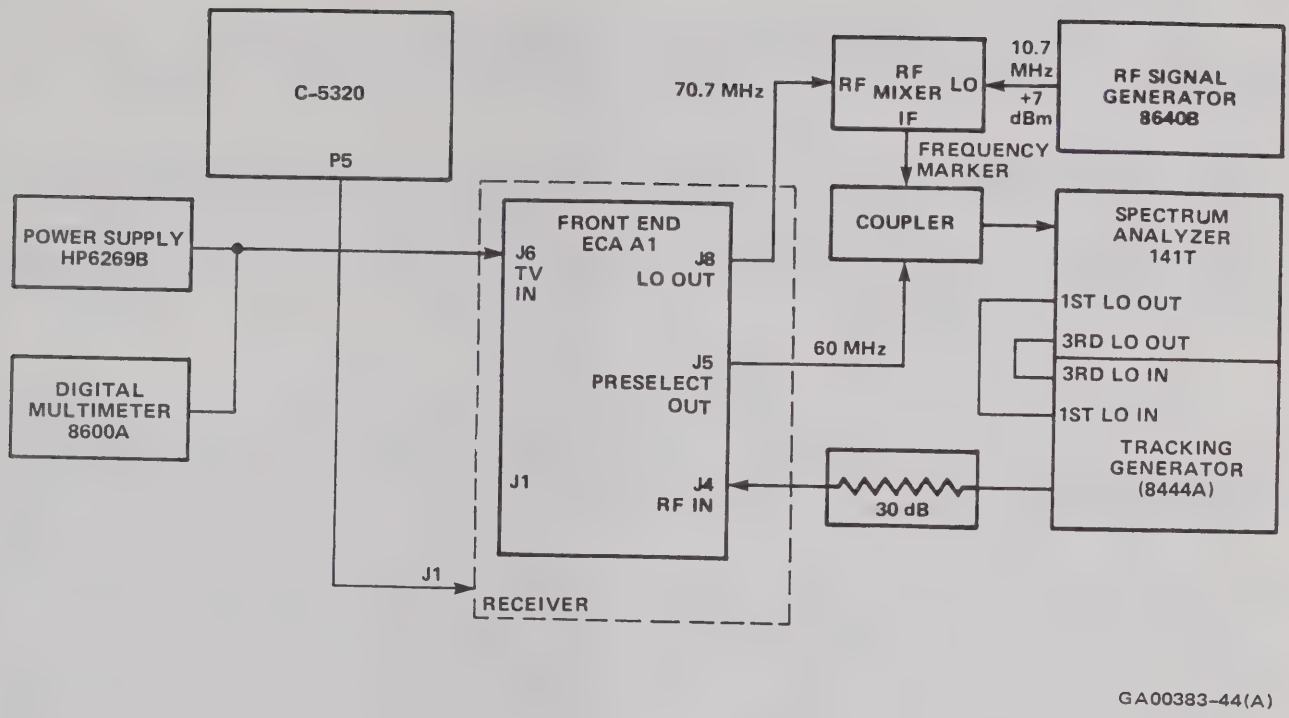

Figure B-10. LO Tracking Adjustment Setup

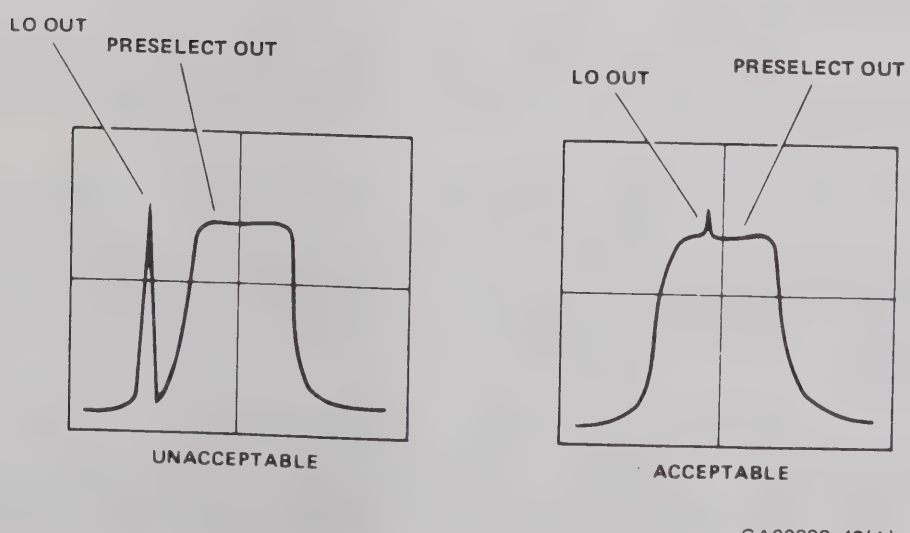

Figure B-11. LO Tracking Adjustment Spectrum Analyzer Displays

(6) On C-5320, enter 44 on keyboard and press ENTER key (selects band 2).

(7) Adjust A1A2 T2 to bring LO output spike up onto the peak of preselect output signal. See figure B-11 for display examples.

(8) After centering LO output on preselect output, gradually decrease power supply output setting while tracking preselect/LO output display on the spectrum analyzer. Verify that LO output remains on top of preselect output throughout the band 2 range (36 to 60 MHz). LO output must appear on or above -1 dB point on preselect output signal.

i. Band 3 LO Tracking Adjustments.

(1) Disconnect the RF coupler from the spectrum analyzer RF INPUT and move the RF signal generator output from the mixer to the spectrum analyzer RF INPUT port.

(2) Set RF signal generator frequency to 100.000 MHz. Center and stabilize 100-MHz signal on the spectrum analyzer display.

(3) Reconnect the equipment setup as shown in figure B-10.

(4) Set RF signal generator frequency to 30.0 MHz.

(5) Set power supply output to 30.00 V dc.

(6) On C-5320, enter 60 on keyboard and press ENTER key (selects band 3).

(7) Adjust A1A2 T3 to bring LO output spike up onto the peak of preselect output signal. See figure B-11 for display examples.

(8) After centering LO output on preselect output, gradually decrease power supply output while tracking preselect/LO output display on the spectrum analyzer. Verify that LO output remains on top of preselect output throughout the band 3 range (60 to 100 MHz). LO output must appear on or above -1 dB point on preselect output signal.

j. Band 4 LO Tracking Adjustments.

(1) Disconnect the RF coupler from the spectrum analyzer RF INPUT and move the RF signal generator output from the mixer to the spectrum analyzer RF INPUT port.

(2) Set RF signal generator frequency to 150.000 MHz. Center and stabilize 150-MHz signal on the spectrum analyzer display. Set spectrum analyzer SCAN WIDTH switch to 5 MHz/div.

(3) Reconnect the equipment setup as shown in figure B-10.

(4) Set RF signal generator frequency to 30.0 MHz.

(5) Set power supply output to 30.00 V dc.

(6) On C-5320, enter 100 on keyboard and press ENTER key (selects band 4).

(7) Adjust A1A2 T4 to bring LO output spike up onto the peak of preselect output signal. See figure B-11 for display examples.

(8) After centering LO output on preselect output, gradually decrease power supply output while tracking preselector/LO output display on the spectrum analyzer. Verify that LO output remains on top of preselect output throughout the band 4 range (100 to 150 MHz). LO output must appear on or above -1 dB point on preselect output signal.

B.3.1.3 FIRST AND SECOND IF AMPLIFIER/DETECTOR ECA A3. Adjustment of first and second IF amplifier/detector ECA A3 is accomplished by inductively tuning the second IF amplifier/detector CCA A3A2, AM detector input, three bandpass filters, and the 30-MHz IF frequency range and gain filters. All adjustments are made by adjusting center slugs in tunable coils.

CAUTION

Ensure that power is not applied to the C-5320 during equipment setup.

a. Equipment Setup. Connect equipment as shown in figure B-12, as follows:

(1) Connect first IF output (ECA A3 J5) to the spectrum analyzer input port.

(2) Connect RF input (ECA A3 J1) to the tracking generator output through a step attenuator.

b. Equipment Control Settings. Before beginning adjustments, set equipment controls as follows:

(1) Spectrum analyzer controls:

RF section:
FREQUENCY - 10.700 MHz
BANDWIDTH - 100 kHz

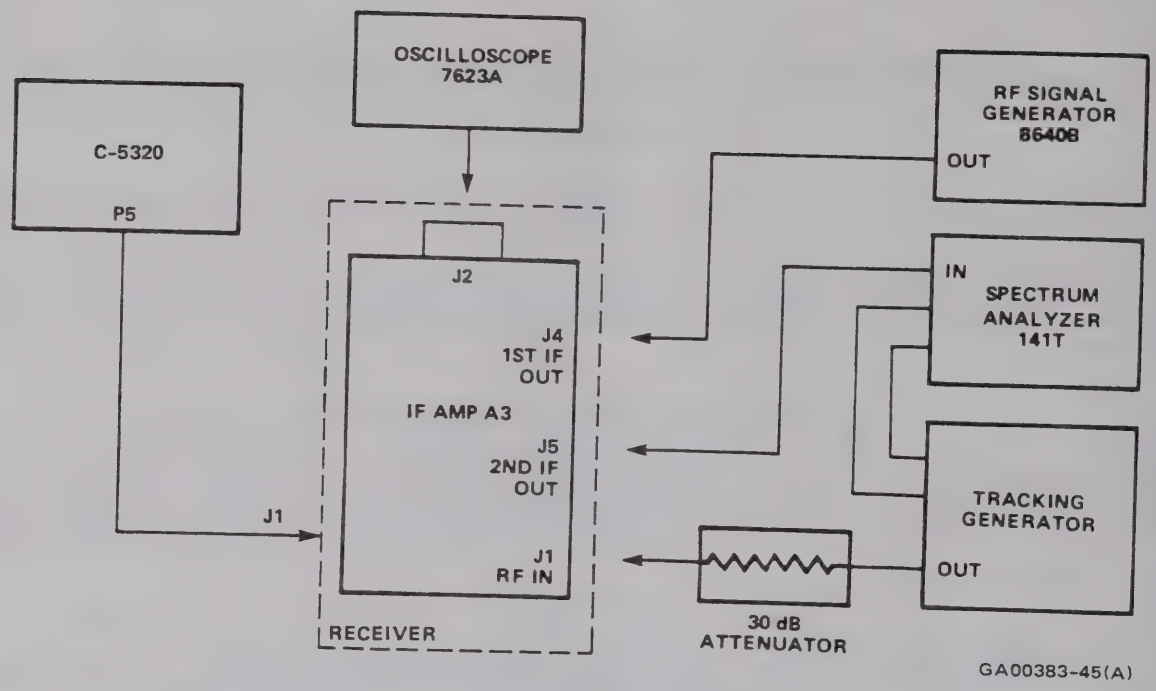

Figure B-12. First and Second IF Amplifier/Detector ECA A3 Adjustment Setup

SCAN WIDTH - 10 kHz/div
INPUT ATTENUATION - 40 dB

IF section:
BASE LINE CLIPPER - Fully ccw
SCAN TIME PER DIVISION - 1 MS
LOG REF LEVEL - 10 dB
LOF REF LEVEL vernier dial - 0 dB
VIDEO FILTER - OFF
SCAN MODE - INT
SCAN TRIGGER - AUTO

Display section - CONV

(2) Tracking generator controls. Connect tracking generator output through 30 dB attenuator to spectrum analyzer input. Set TRACK ADJ for peak signal on spectrum analyzer. Set LEVEL control for -40 dB signal on spectrum analyzer. Reconnect spectrum analyzer and tracking generator as described in a., above.

(3) C-5320 controls:

Enter 35 on keyboard and press ENTER key.

Press SHIFT key, then . key.

Enter 50 on keyboard and press ENTER key.

Set MODE switch to FM.

c. 50-kHz Bandwidth Filter Adjustment.

(1) Reference figure B-13 for adjustment locations.

(2) Adjust A3A1 coils L18, L23, and L24 for maximum gain with the flattest signal spectrum top displayed on the spectrum analyzer. Use a trial-and-error approach to identify the effect of each coil adjustment until the desired shape with maximum gain is attained. See figure B-14 for bandpass display example.

d. 30-kHz Bandwidth Filter Adjustment.

(1) On C-5320, enter 30 on keyboard and press ENTER key.

(2) Adjust A3A1 coils L16 and L17 as required for maximum gain and 30-kHz bandpass shape displayed on the spectrum analyzer. See figure B-14 for bandpass display example.

e. 8-kHz Bandwidth Filter Adjustment.

(1) On C-5320, enter 08 on keyboard and press ENTER key.

(2) Set spectrum analyzer SCAN WIDTH control to 5 kHz.

(3) Adjust A3A1 coils L21 and L22 as required for maximum gain and 8-kHz bandpass shape displayed on the spectrum analyzer. See figure B-14 for bandpass display example.

f. Second IF Amplifier/Detector CCA A3A2 Filter Adjustment.

(1) Move the spectrum analyzer input cable connection from ECA A3 J5 to ECA A3 J4.

(2) On C-5320, enter 50 on keyboard and press ENTER key.

(3) Set the spectrum analyzer SCAN WIDTH control setting to 10 kHz.

(4) Adjust A3A2 coils L1, L2, and L3 as required for maximum gain and 50-kHz bandpass shape displayed on the spectrum analyzer. See figure B-14 for bandpass display example.

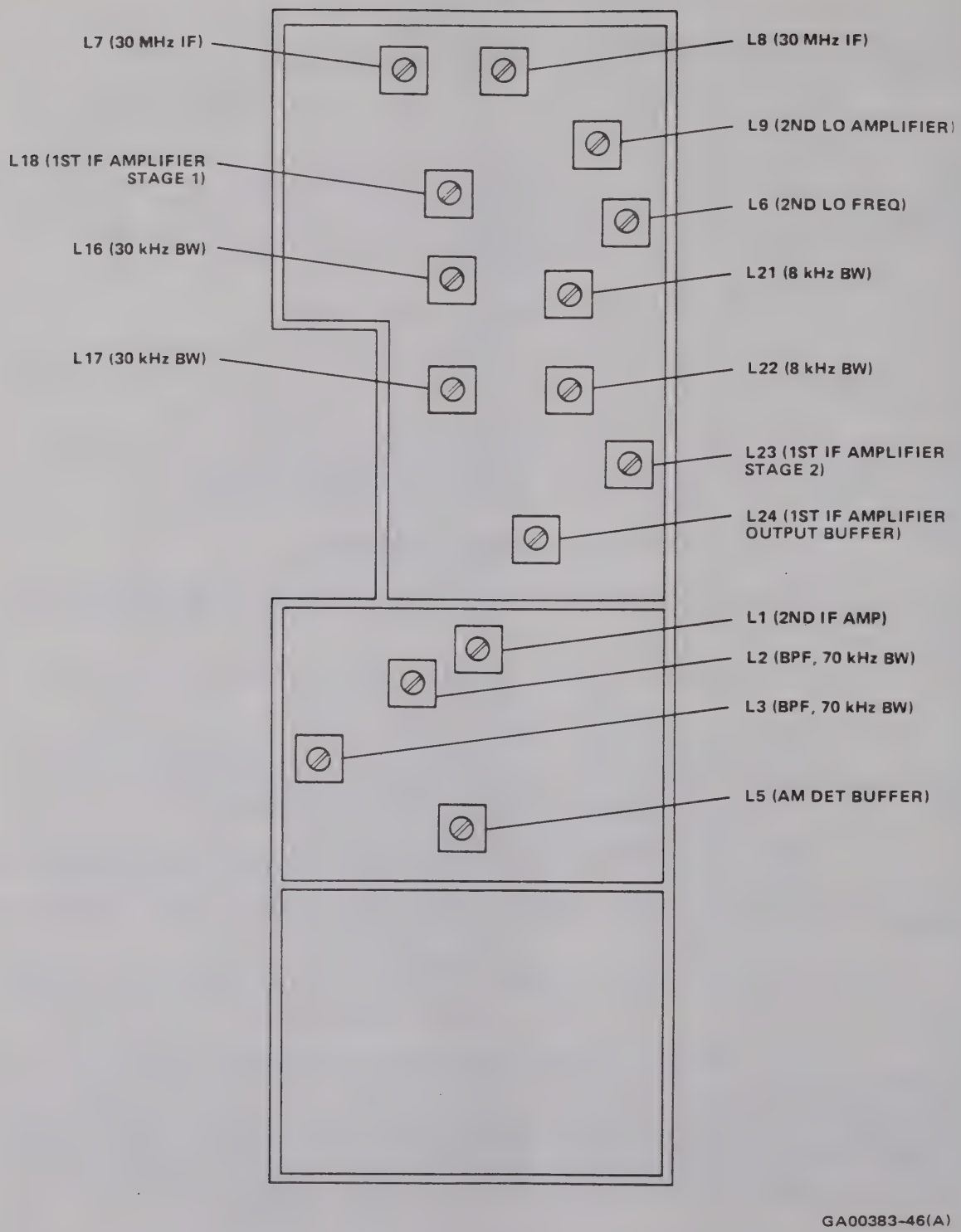
L7 (30 MHz IF)
L8 (30 MHz IF)
L9 (2ND LO AMPLIFIER)
L18 (1ST IF AMPLIFIER STAGE 1)
L6 (2ND LO FREQ)
L16 (30 kHz BW)
L21 (8 kHz BW)
L17 (30 kHz BW)
L22 (8 kHz BW)
L23 (1ST IF AMPLIFIER STAGE 2)
L24 (1ST IF AMPLIFIER OUTPUT BUFFER)
L1 (2ND IF AMP)
L2 (BPF, 70 kHz BW)
L3 (BPF, 70 kHz BW)
L5 (AM DET BUFFER)
GA00383-46(A)

Figure B-13. First and Second IF Amplifier/Detector ECA A3 Adjustment Locations (Sheet 1 of 3)

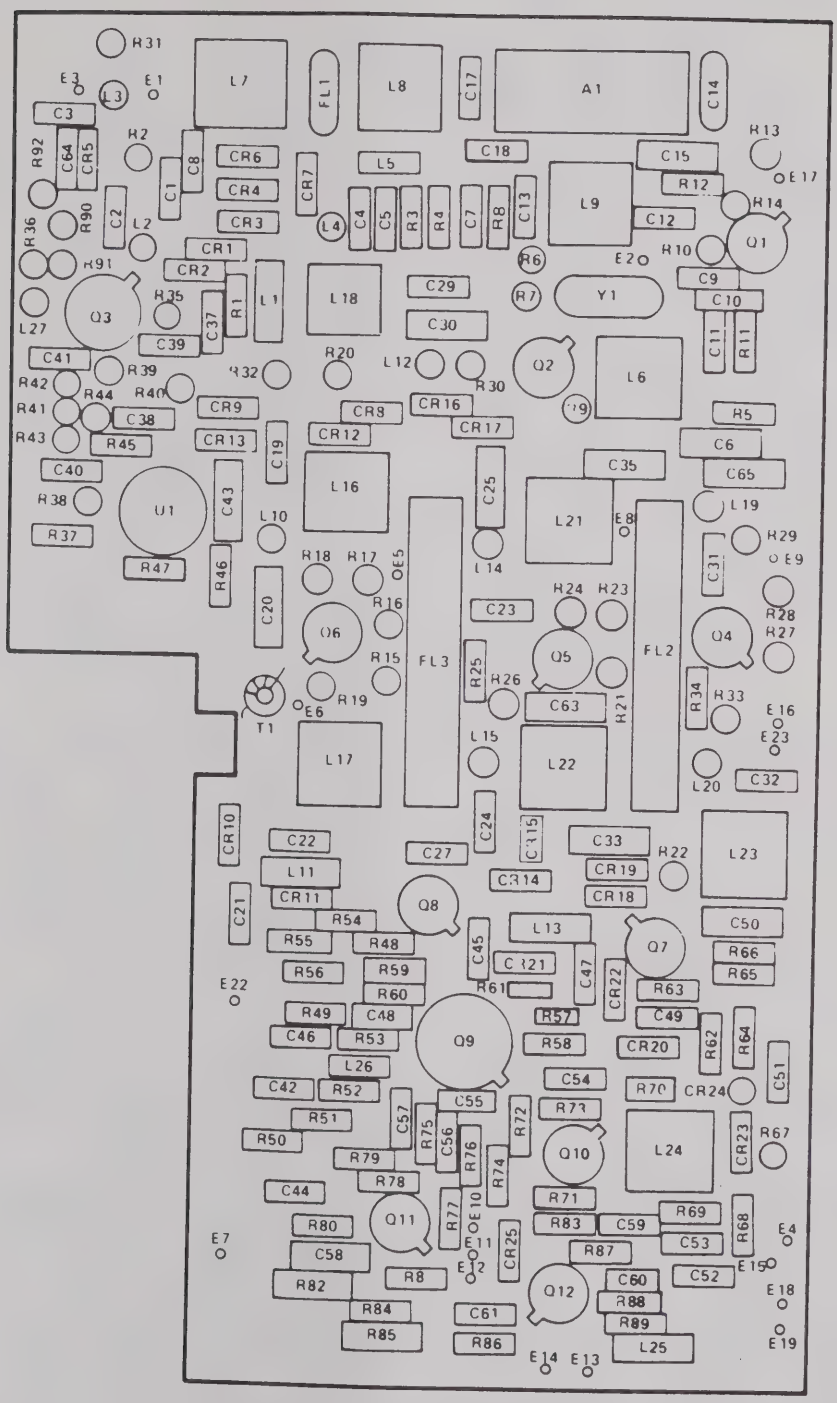

Figure B-13. First and Second IF Amplifier/Detector ECA A3 Adjustment Locations (Sheet 2 of 3)

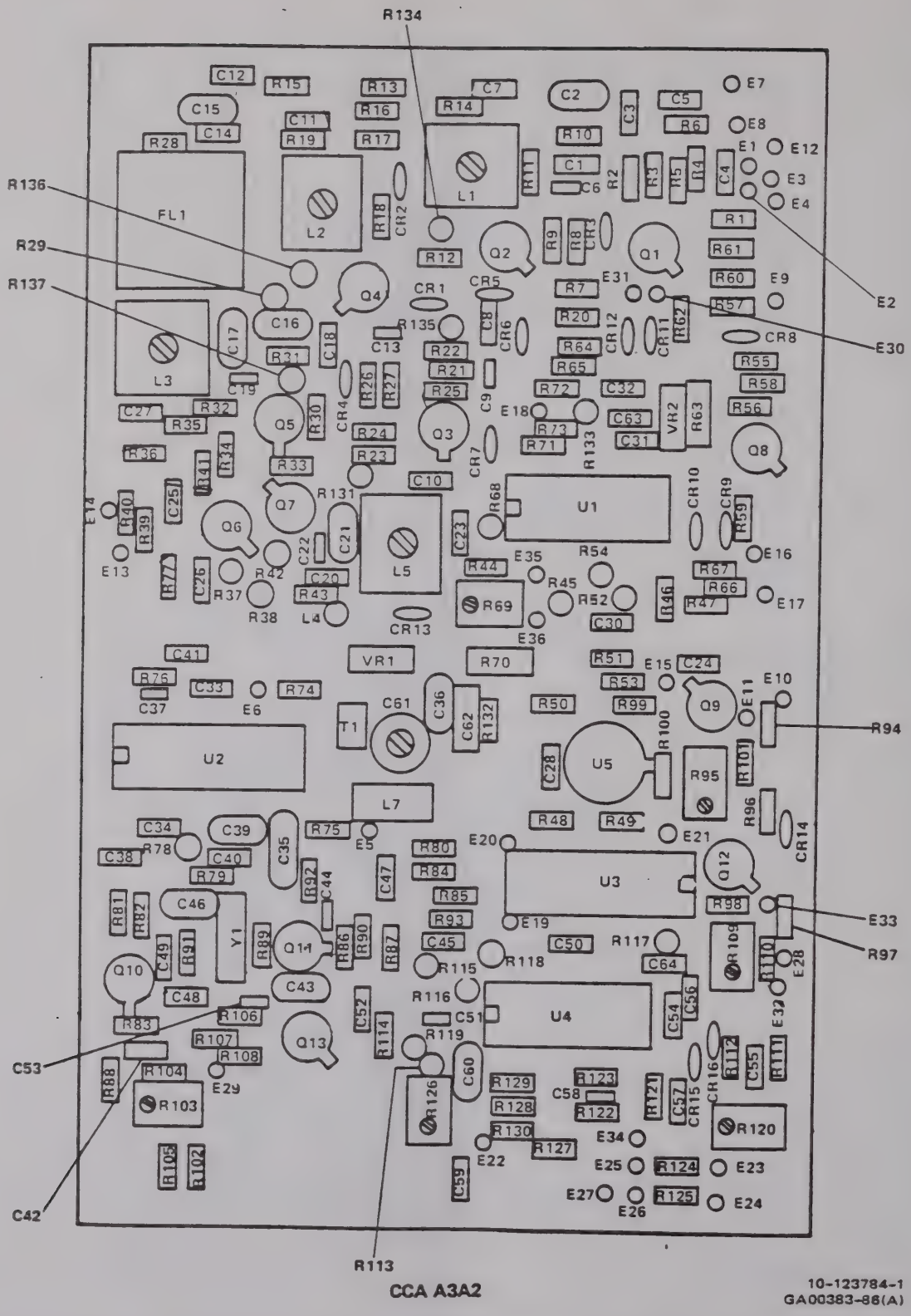

Figure B-13. First and Second IF Amplifier/Detector ECA A3 Adjustment Locations (Sheet 3 of 3)

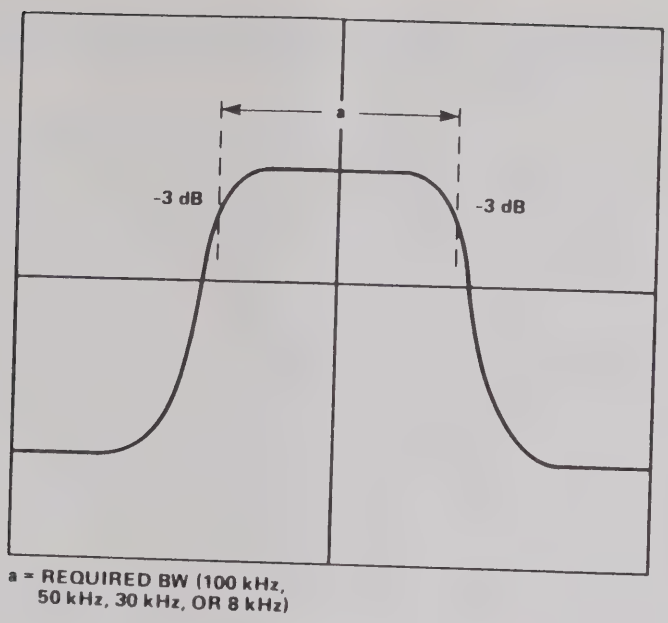

Figure B-14. Bandpass Display Example

g. AM Detector Input Filter Adjustment.

(1) Set RF signal generator controls as follows:

OUTPUT LEVEL - -80 dB
FREQUENCY - 35.000 MHz
FM modulation - OFF
AM modulation - INT
MODULATION FREQUENCY - 1 kHz (adjust level for 30 percent modulation)
RF OUTPUT - ON

(2) Set C-5320 controls as follows:

Press SHIFT key, then • key.

Enter 08 on keyboard and press ENTER key.

Press SHIFT key, then • key.

Enter 35 on keyboard and press ENTER key.

Set MODE switch to AM.

(3) Move input cable connector from the tracking generator output port to the RF signal generator output port so that the RF signal generator is connected to ECA A3 J1.

(4) Turn the VOLUME control knob A3R1 fully clockwise for maximum gain.

(5) Using an oscilloscope, monitor the audio output at the headset output jack A3 J3.

(6) Turn the tuning slug on L5 counterclockwise until it is backed out of the coil; then slowly turn it clockwise until the first output signal peak is observed.

NOTE

On some modules it is possible to attain a second peak by continuing to turn tuning slug. The first peak, with the least coupling, is the one desired.

h. 30-MHz IF Adjustments.

NOTE

First IF amplifier/detector CCA A3A1 bottom cover must be removed to gain access to test points in this step.

(1) On C-5320, enter 30 on keyboard and press ENTER key.

(2) Set spectrum analyzer SCAN WIDTH to 50 kHz/div.

(3) Use RF signal generator to set spectrum analyzer to 30 MHz center frequency.

(4) Connect tracking generator output to ECA A3 J1.

(5) Using high impedance ($\geq$10 MΩ) FET probe, observe signal at A3A1 A1-8 and adjust A3A1 coils L7 and L8 for maximum gain and 100-kHz bandpass shape. See figure B-14 for bandpass display example.

(6) Connect counter input of RF signal generator to A3A1 Q1-G1 (R11) and adjust A3A1 coil L6 for a frequency of 19.3 (±0.0009) MHz.

(7) Connect RF signal generator RF OUTPUT to A3 J1 and set controls as follows:

Frequency - 30.000 MHz
Output level - -30 dBm
Modulation - Off

(8) With spectrum analyzer tuned to 10.7 MHz and connected to A3 J5, adjust A3A1 coil L9 for maximum gain displayed on spectrum analyzer.

(9) Repeat step (6), above, and readjust A3A1 coil L6 if necessary.

NOTE

Adjustments of the FM discriminator (C61), ALC (R103 and R109), AGC offset (R69), squelch (R95), and audio outputs (R120 and R126) are performed in the receiver final adjustment procedure (see paragraph B.3.2).

B.3.1.4 SINGLE-SIDEBAND (SSB) ADAPTER ECA A4. Adjustment of SSB adapter ECA A4 is accomplished by inductively tuning the 10.7-MHz notch filter contained on SSB CCA A4A1. All adjustments are made by adjusting center slugs in tunable coils.

a. Equipment Setup. Connect equipment as shown in figure B-15, as follows:

(1) Connect J1 of SSB adapter ECA A4 to J4 of the test fixture.

NOTE

The test fixture must be fabricated locally. Refer to appendix C for fabrication information.

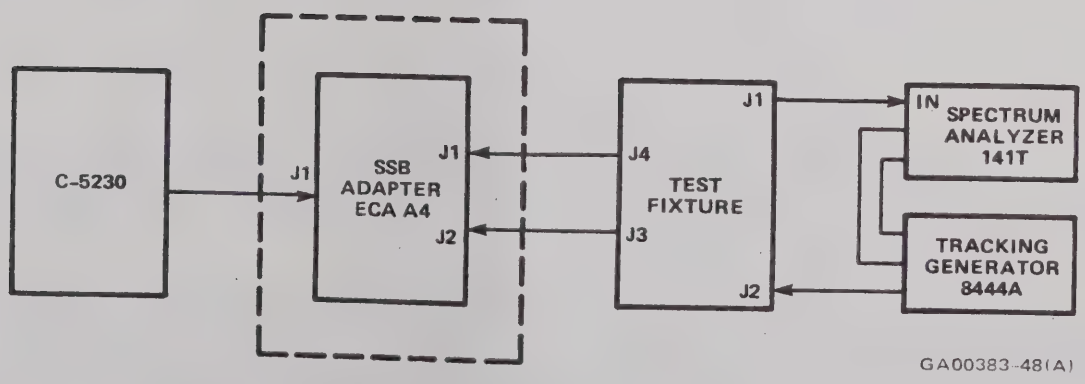

Figure B-15. SSB ECA A4 10.7-MHz Notch Filter Adjustment Setup

(2) Connect J2 of SSB adapter ECA A4 to J3 of the test fixture.

(3) Connect J1 of the test fixture to the spectrum analyzer input port.

(4) Connect J2 of the test fixture to the tracking generator output port.

b. Equipment Control Settings. Before beginning adjustment, set equipment controls as follows:

(1) Spectrum analyzer controls:

RF section:

FREQUENCY - 10.7 MHz
BANDWIDTH - 100 kHz
SCAN WIDTH - 5 MHz

IF section:

SCAN TIME - 50 msec/div

c. Calibration of Adjustment Equipment. The tracking generator output is connected to the spectrum analyzer input port through the test cables and calibrated to establish a -10 dBm reference, which includes cable losses. Perform calibration as follows:

(1) Disconnect cables at J1 and J2 of the test fixture.

(2) Use an adapter to connect the two disconnected cable ends.

(3) Adjust tracking generator for a -10 dBm output.

(4) Reconnect the equipment setup as shown in figure B-15.

d. 10.7-MHz Notch Filter Adjustment. The signal adjusted in this procedure is very narrow (<10 kHz wide). Use the following procedure to locate, display, and adjust the signal. See figure B-16 for adjustment locations.

(1) With spectrum analyzer SCAN WIDTH at 5 MHz/div, the spectrum analyzer LO should be two divisions to the left of display centerline and A4A1 output should be on display centerline. Gradually decrease SCAN WIDTH setting to 2 kHz/div while adjusting FREQUENCY and FINE TUNE controls to keep A4A1 output centered on display.

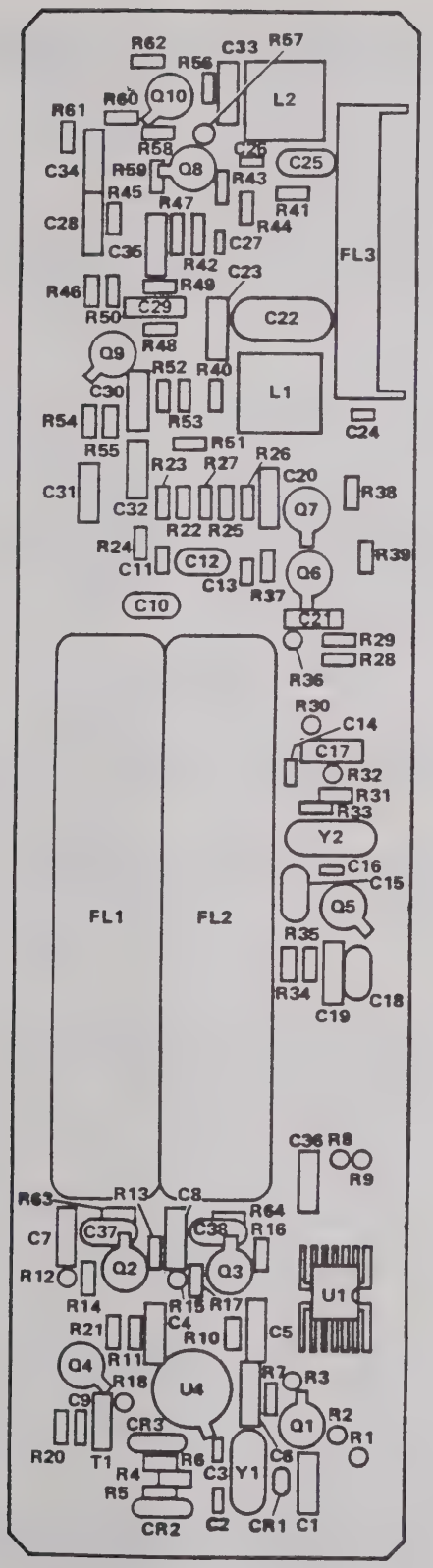

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Figure B-16. SSB Adapter ECA A4 Adjustment Locations

(2) With spectrum analyzer SCAN WIDTH setting at 2 kHz/div and signal centered on screen, set TUNING STABILIZER to ON position and use FINE TUNE control to recenter signal.

(3) Remove top cover of ECA A4. Do not allow feed-thru pins to touch module chassis.

(4) Adjust A4A1 L1 and L2 to obtain waveform as shown in figure B-17. The notch at 10.7 MHz must be 20 dB or more below the signal peak.

B.3.2 FINAL ADJUSTMENT AND TESTING.

Each subassembly is adjusted, as described in paragraph B.3.1., after repair and prior to assembly. After final assembly of the R-5076/U (see paragraph 5.6.2), perform the following adjustments to achieve compatibility between individual units so that the entire unit operates properly.

CAUTION

Ensure that power is not applied to the C-5320 during equipment setup.

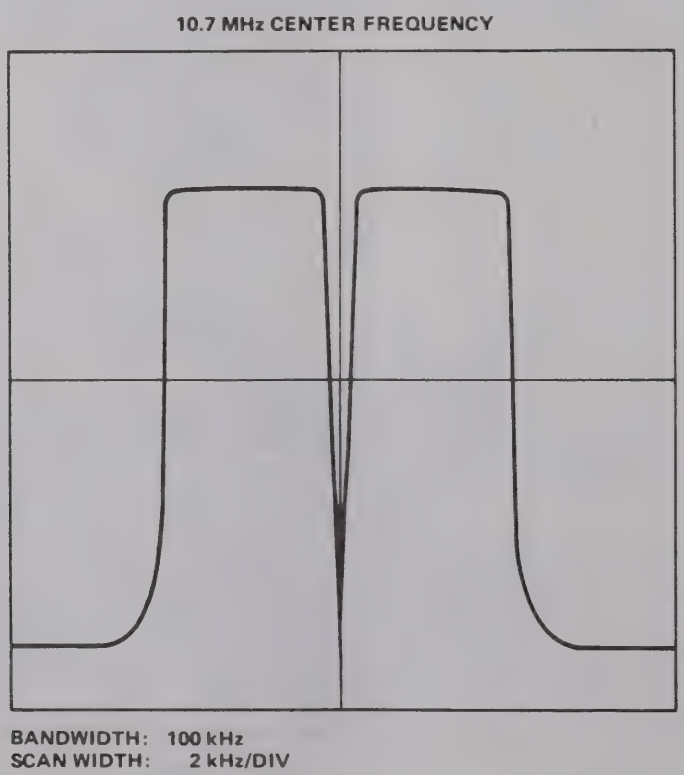


Figure B-17. SSB Adapter CCA A4A1 10.7-MHz Notch Filter Display

a. Equipment Setup. Connect equipment as shown in figure B-18 as follows:

(1) Connect RF signal generator RF OUT port to receiver J4 input port.

(2) Remove R-5076/U bottom cover.

(3) Set C-5320 controls as follows:

Enter 35 on keyboard and press ENTER key.

Set MODE switch to AM.

Press SHIFT key, then • key.

Enter 08 on keyboard and press ENTER key.

Press SHIFT key, then • key.

(4) Set RF signal generator controls as follows:

POWER - ON
All modulation controls - OFF
FREQUENCY - 35.000 MHz
OUTPUT LEVEL - -130 dBm
RF OUT - ON
OUTPUT FREQ LEVEL vernier dial - Set to -140 dB by pressing VOLTS button (next to output meter) and adjusting for a -10 dB indication on the bottom meter scale.

(5) Set receiver AUDIO VOLUME GAIN control R1 fully clockwise (maximum) and plug headset into the receiver HEADSET jack. Ensure that no tone is audible. This check ensures that no internal signals are present that would invalidate the following adjustments.

NOTE

See figure B-19 for adjustment locations.

b. Automatic Gain Control (AGC) Adjustment.

(1) Adjust CCA A3A2 R69 to obtain 0 (±10) millivolts on the digital multimeter.

(2) Change RF signal generator output level to -10 dBm and verify that the indicated output voltage is +5 (±1) V dc on the digital multimeter.

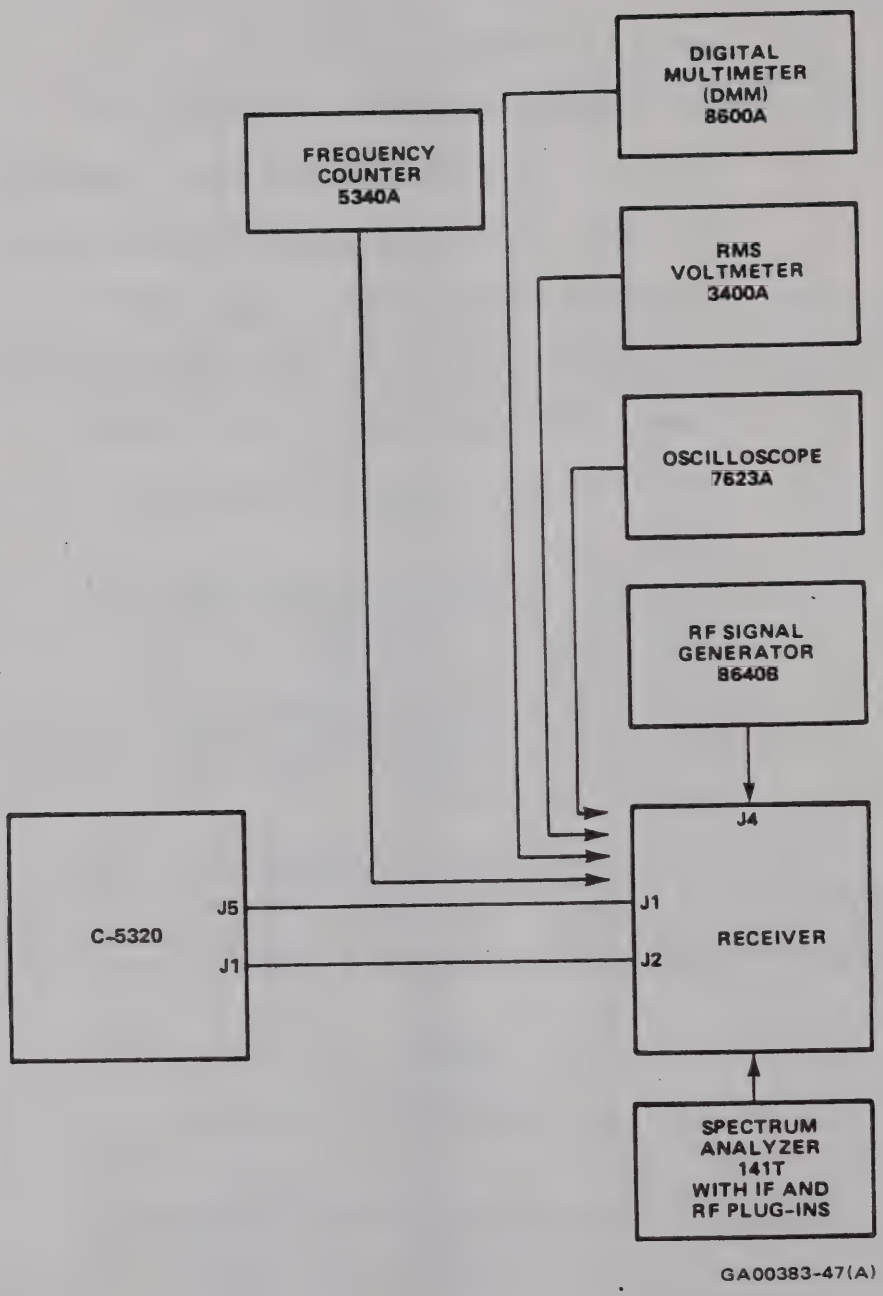


Figure B-18. Radio Receiver R-5076/U Final Adjustment Setup

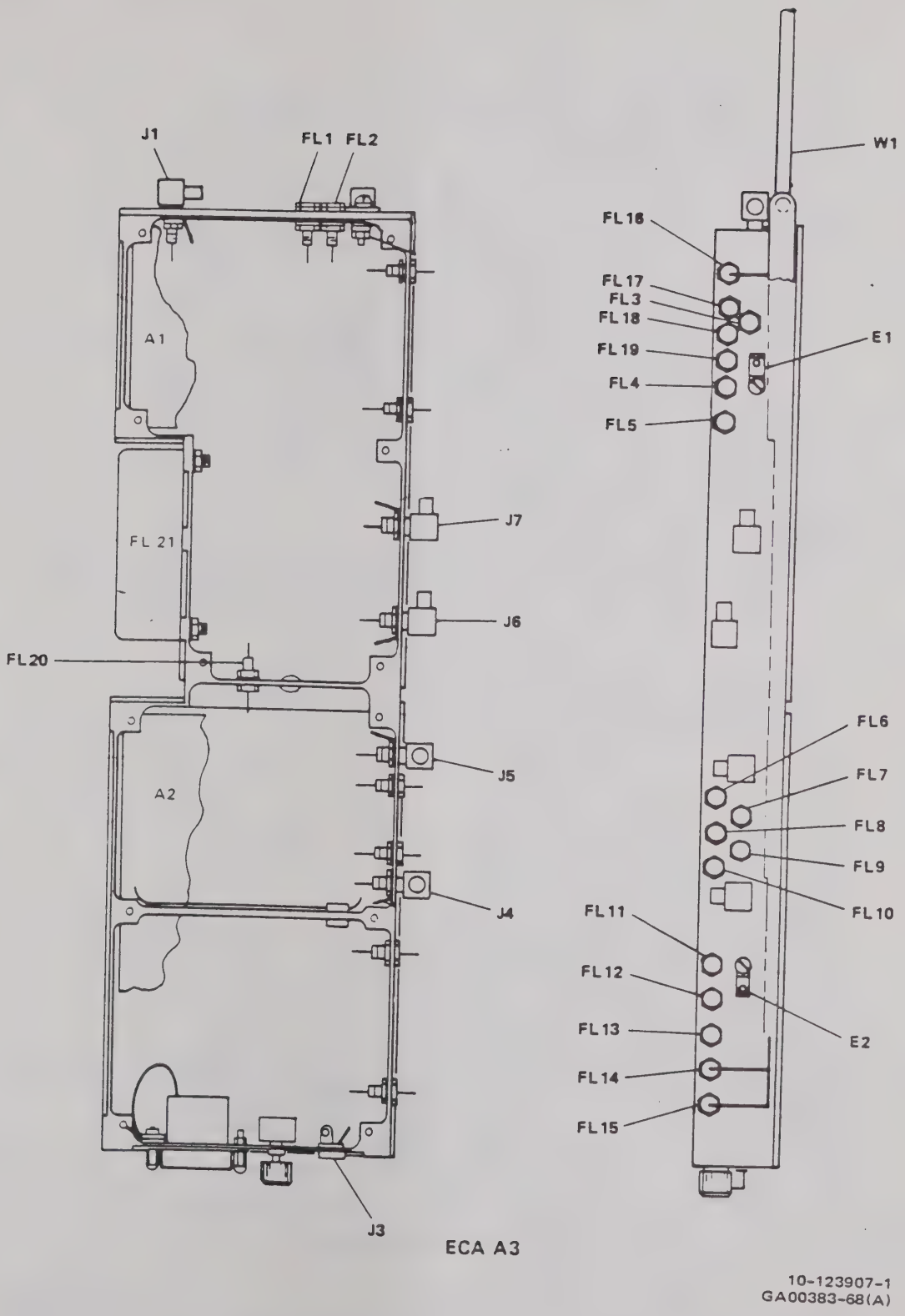


Figure B-19. Radio Receiver R-5076/U Final Adjustment Locations (Sheet 1 of 3)

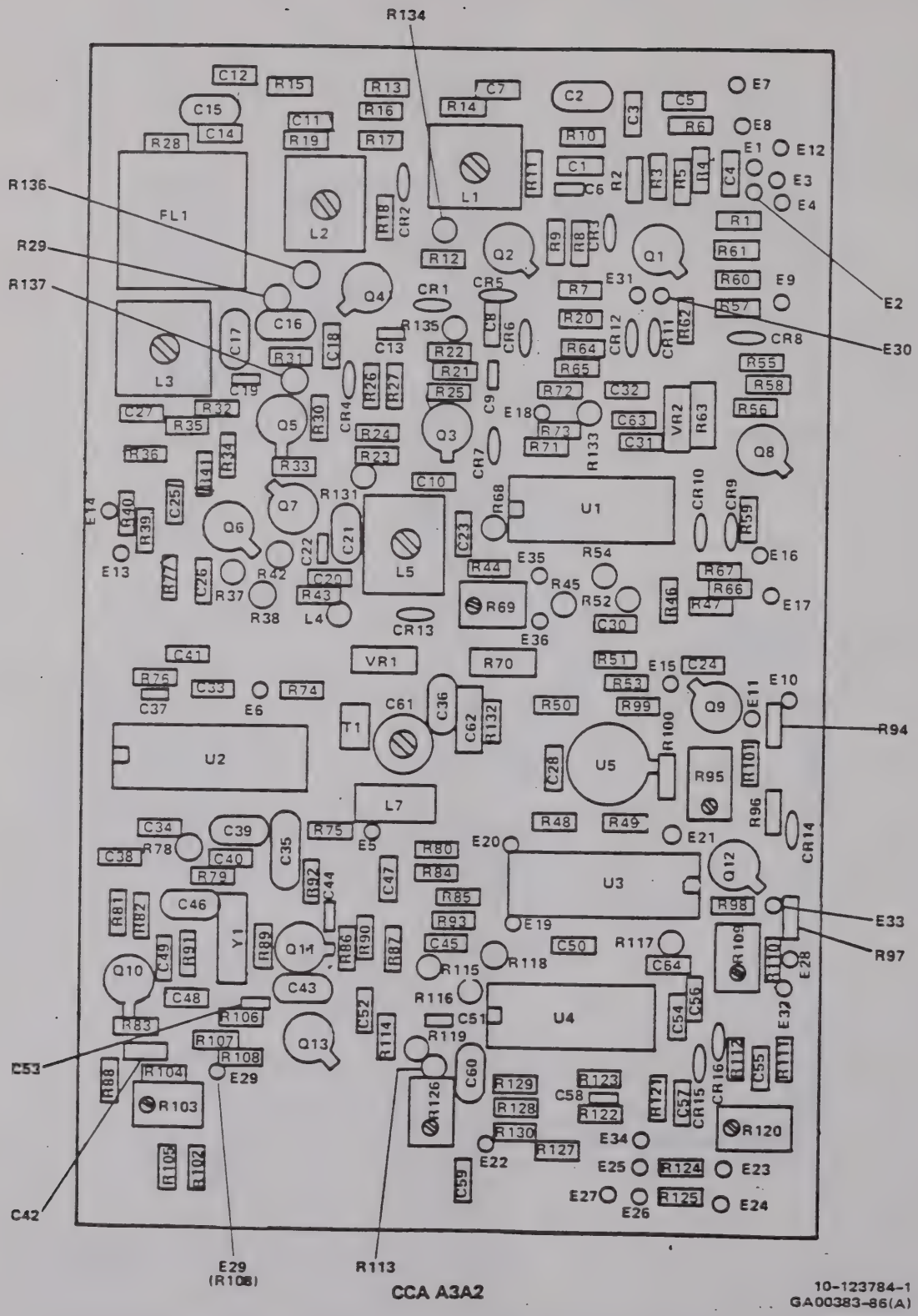


Figure B-19. Radio Receiver R-5076/U Final Adjustment Locations (Sheet 2 of 3)

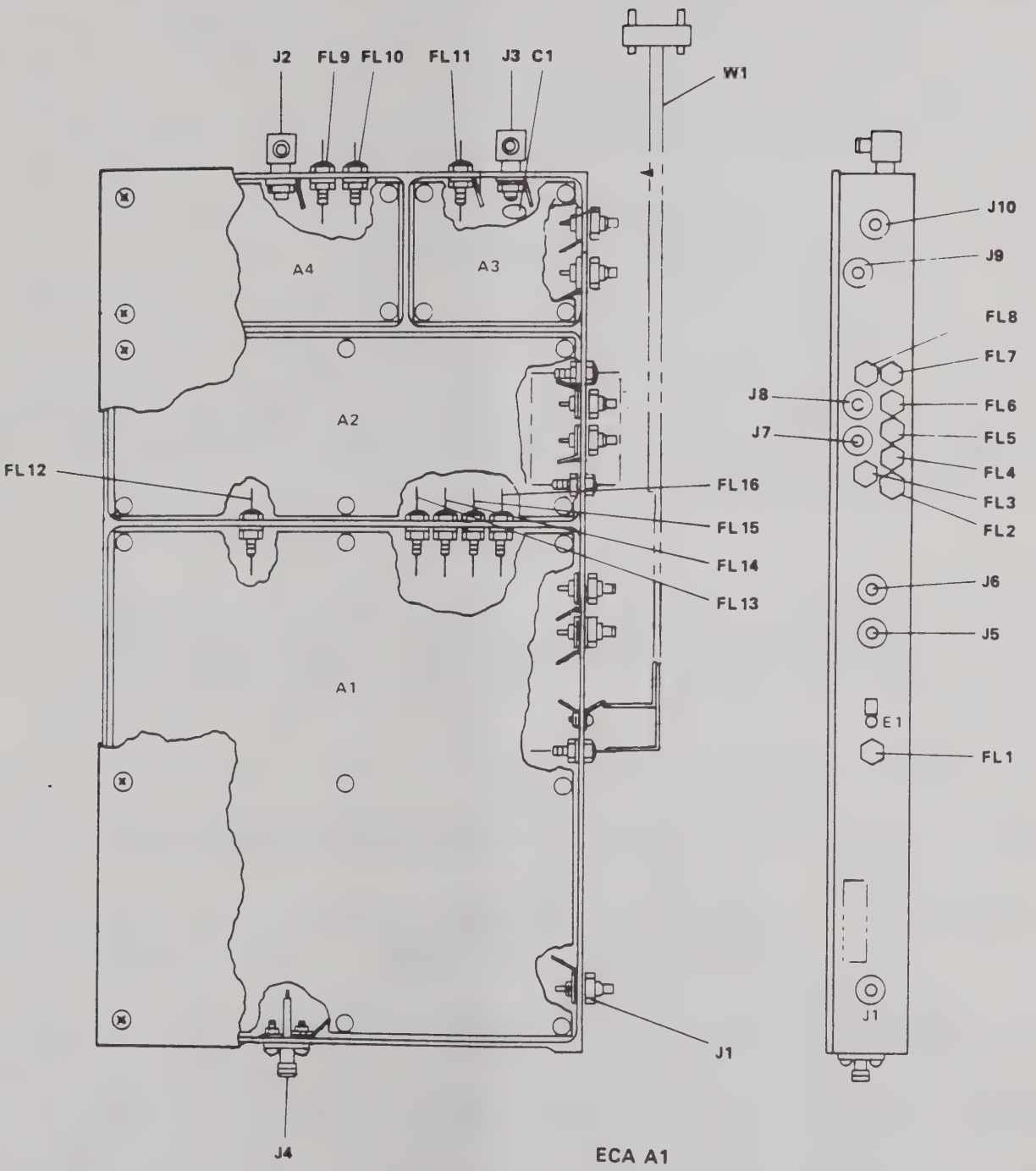


Figure B-19. Radio Receiver R-5076/U Final Adjustment Locations (Sheet 3 of 3)

c. 19.3-MHz Oscillator Fine Tuning.

(1) Set C-5320 controls as follows:

Enter 120 on keyboard and press ENTER key.

Set MODE switch to CW.

(2) Set RF signal generator controls as follows:

OUTPUT LEVEL - -60 dBm
All modulation controls - OFF
FREQUENCY - 120.000 MHz

(3) Connect oscilloscope to headphone jack on front panel of receiver.

(4) Adjust CCA A3A1 L6 (19.3-MHz oscillator tuning coil) for a minimum signal. Check R-5076/U operation by varying the RF signal generator output frequency ±1 kHz on each side of the 120-MHz input. The audio output should rise from 0 to 1 kHz on either side of 120 MHz.

NOTE

Because of the inherent instability of the 19.3-MHz oscillator, an averaging process may be necessary to determine proper, or most desirable, setting of L6.

d. AM Detector Fine Tuning.

(1) Set signal generator controls as follows:

AM switch - INT
MODULATION FREQUENCY - 1 kHz
MODULATION 0-100% - 30%
OUTPUT LEVEL - -100 dBm

(2) Connect oscilloscope to headphone jack on front panel of receiver.

(3) Connect an RMS voltmeter (calibrated in dB) to headphone jack on front panel of receiver and record output level.

(4) Adjust CCA A3A2 L5 for a maximum output indication on the RMS voltmeter.

e. AGC Check. Perform this test to determine if repair of AGC circuits is required before returning the unit to service.

(1) Record the output level indicated on the RMS voltmeter.

(2) Increase RF signal generator OUTPUT LEVEL switch setting to -30 dBm.

(3) Record the level indicated on the RMS voltmeter. The difference between this level and the level recorded in step (2), above, should be 3 dB or less. If the difference is greater than 3 dB, perform AGC troubleshooting procedures.

f. FM Discriminator Fine Tuning.

(1) Set RF signal generator controls as follows:

Frequency - 35.000 MHz
Modulation - FM, 15 kHz Peak Deviation
Modulation Frequency - 1 kHz
Output Level - -60 dBm

(2) Set C-5320 controls as follows:

Enter 35 on keyboard and press ENTER key.

Set MODE switch to FM.

Press SHIFT key, then • key.

Enter 50 on keyboard and press ENTER key.

Press SHIFT key, then • key.

(3) Connect oscilloscope CH1 to J2-4 of the receiver.

(4) Increase RF signal generator - FM peak deviation until distortion occurs in the sine wave observed on the oscilloscope.

(5) If the FM discriminator is properly adjusted, the waveform distortion will appear symmetrical. If only one sine wave peak distorts (positive or negative), proceed to step (6).

(6) Adjust A3A2 C6 to obtain minimum distortion.

(7) Increase FM signal generator-FM peak deviation until distortion occurs once more.

(8) Repeat steps (6) and (7) until no improvement can be gained.

NOTE

The IF bandpass filter limits the bandwidth to 50 kHz. Therefore, as 25-kHz peak deviation is approached, distortion will occur due to the bandwidth limit. This is normal.

g. 30-MHz Filter Fine Tuning.

(1) Configure the RF signal generator to produce an 88.000 MHz unmodulated input to the receiver at -110 dBm.

(2) On C-5320, enter 88 on keyboard and press ENTER key.

(3) Monitor the AGC voltage J2-1 of the receiver with digital multimeter.

(4) Adjust CCA A3A1 L7 and L8 to obtain maximum AGC voltage output as indicated on the digital multimeter. 30 MHz filter should be swept and left alone.

h. Audio Output Adjustments.

(1) Equipment Setup. Set equipment controls as follows:

(a) RF signal generator controls:

FREQUENCY - 35.000 MHz
FM switch - INT
PEAK DEVIATION - 20 kHz (set vernier dial for a reading of 2 on the 0-3 meter scale)
MODULATION FREQUENCY - 1 kHz
OUTPUT LEVEL - -60 dB

(b) DF unit controls:

Enter 35 on keyboard and press ENTER key.

Set MODE switch to FM.

(c) Connect an RMS voltmeter to J2-4 of the receiver.

(2) ALC Threshold Adjustment.

NOTE

The ALC circuit is a relatively slow-acting circuit. Peak deviation changes made during the following steps must be done slowly to avoid getting false drop-point indications.

(a) Slowly rotate the RF signal generator PEAK DEVIATION vernier dial to lower the deviation. Watch the RMS voltmeter for a drop in R-5076/U output. If a drop occurs before the RF signal generator meter reaches 1, adjust CCA A3A2 R109 (threshold control) to bring the output back up to the initial output level. If no drop is detected before the deviation indicator drops to 1 (10-kHz deviation), proceed with step (b), below.

(b) Set the RF signal generator PEAK DEVIATION control to 10 kHz and adjust the vernier dial for a maximum indication on the 0-10 meter scale.

(c) Slowly decrease the deviation while monitoring the RMS voltmeter for a drop indication. Adjust CCA A3A2 R109 so that signal begins to drop off when peak deviation goes below 6 kHz.

(d) Return the RF signal generator PEAK DEVIATION control to 20 kHz and set the vernier dial for a minimum (0) reading on the 0-3 scale.

(e) Slowly increase the deviation while monitoring the RMS voltmeter. The indicated output should rise rapidly as the deviation approaches 6 kHz, then slowly stabilize and maintain a steady level from 6 to 20 kHz deviation.

(3) Output Amplifier Adjustments. Both the wideband and the narrowband output amplifiers require individual adjustment to set output gain in the final stage.

(a) Set the RF signal generator output PEAK DEVIATION at 10 kHz.

(b) Connect oscilloscope to J2-4 of the receiver.

(c) Adjust CCA A3A2 R126 to obtain a 1-volt peak-to-peak, 1-kHz audio signal on the oscilloscope.

(d) Connect the oscilloscope to headphone jack on receiver front panel.

(e) Adjust CCA A3A2 R120 to obtain a 1-volt peak-to-peak, 1-kHz audio signal on the oscilloscope.

APPENDIX C

TEST CABLE FABRICATION INFORMATION

C.1 GENERAL.

This appendix provides information required to build the test cable and test fixture for bench testing and adjusting SSB ECA A4.

C.1.1 TEST CABLE.

Figure C-1 shows part number and wiring information for the test cable.

C.1.2 TEST FIXTURE.

Figure C-2 shows part number and wiring information for the test fixture.

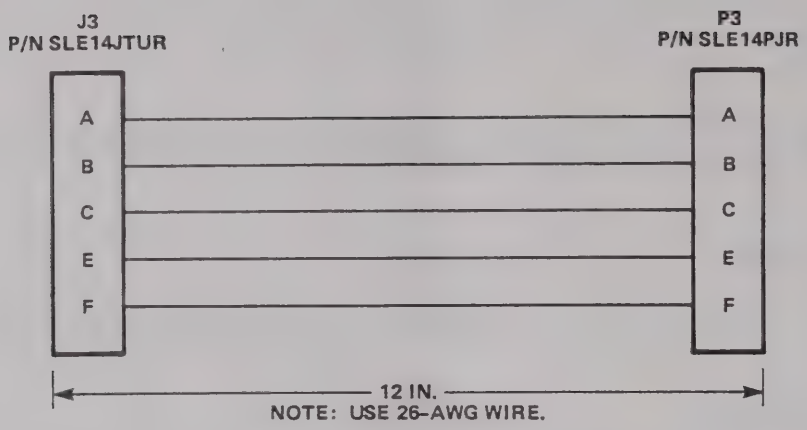


Figure C-1. Test Cable No. 1 (J3 of special cable A4W1 to P3 of special cable A2W1)

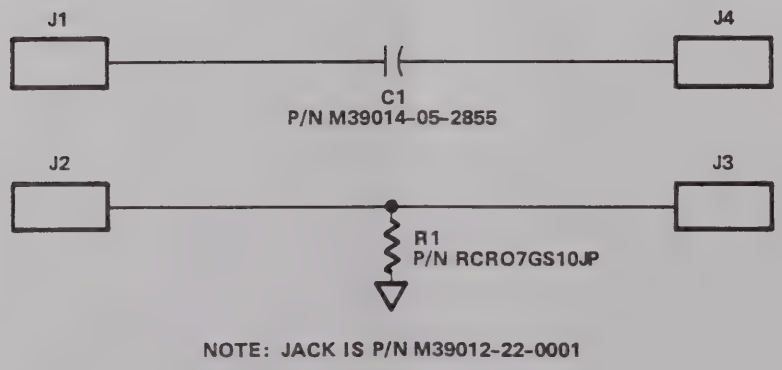


Figure C-2. Test Fixture (connections for test equipment)

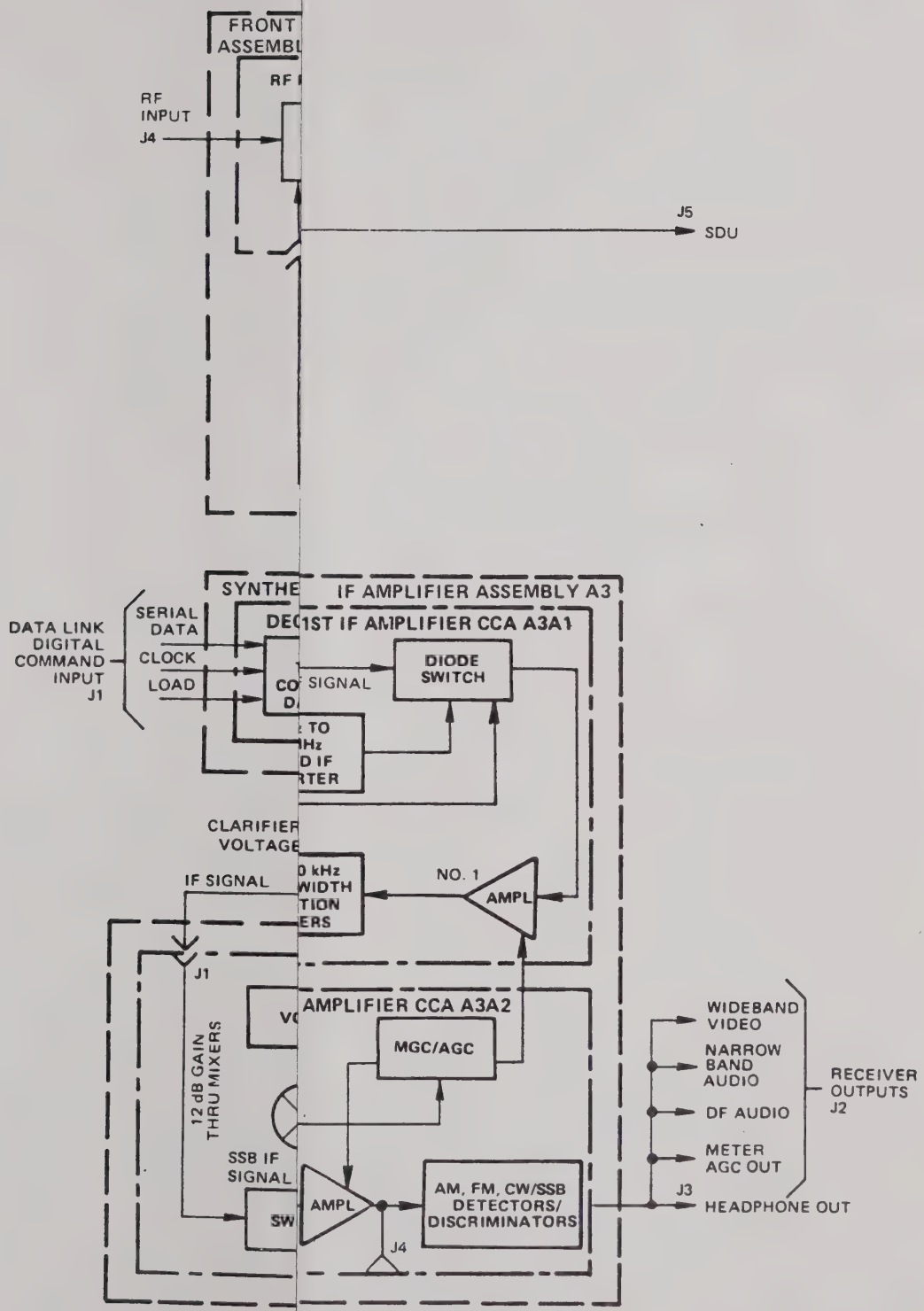


Figure FO-1. Radio Receiver
R-5076/U Functional Block Diagram

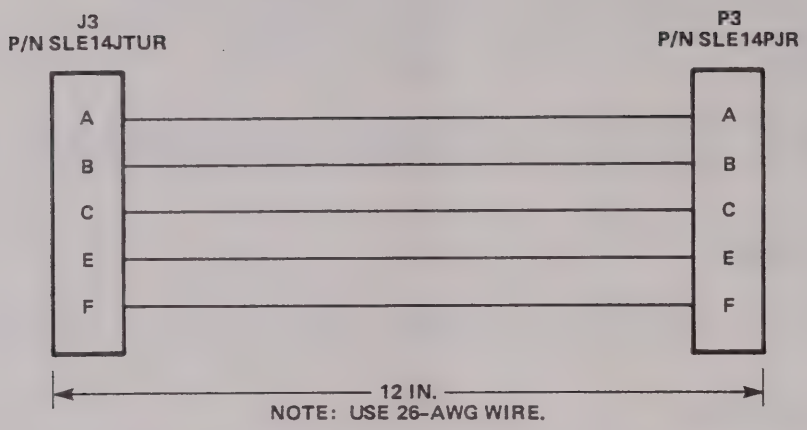


Figure C-1. Test Cable No. 1 (J3 of special cable A4W1 to P3 of special cable A2W1)

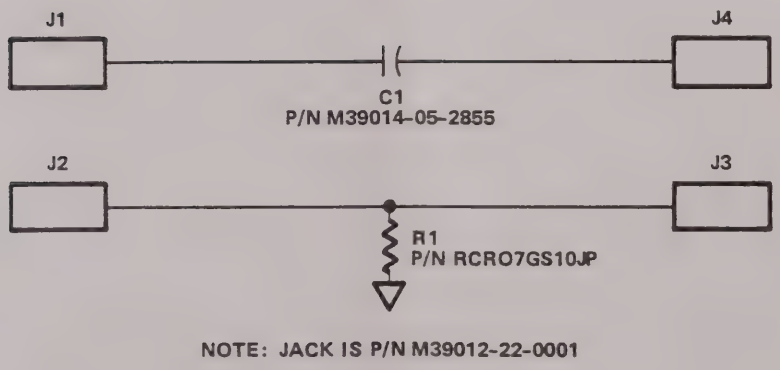


Figure C-2. Test Fixture (connections for test equipment)

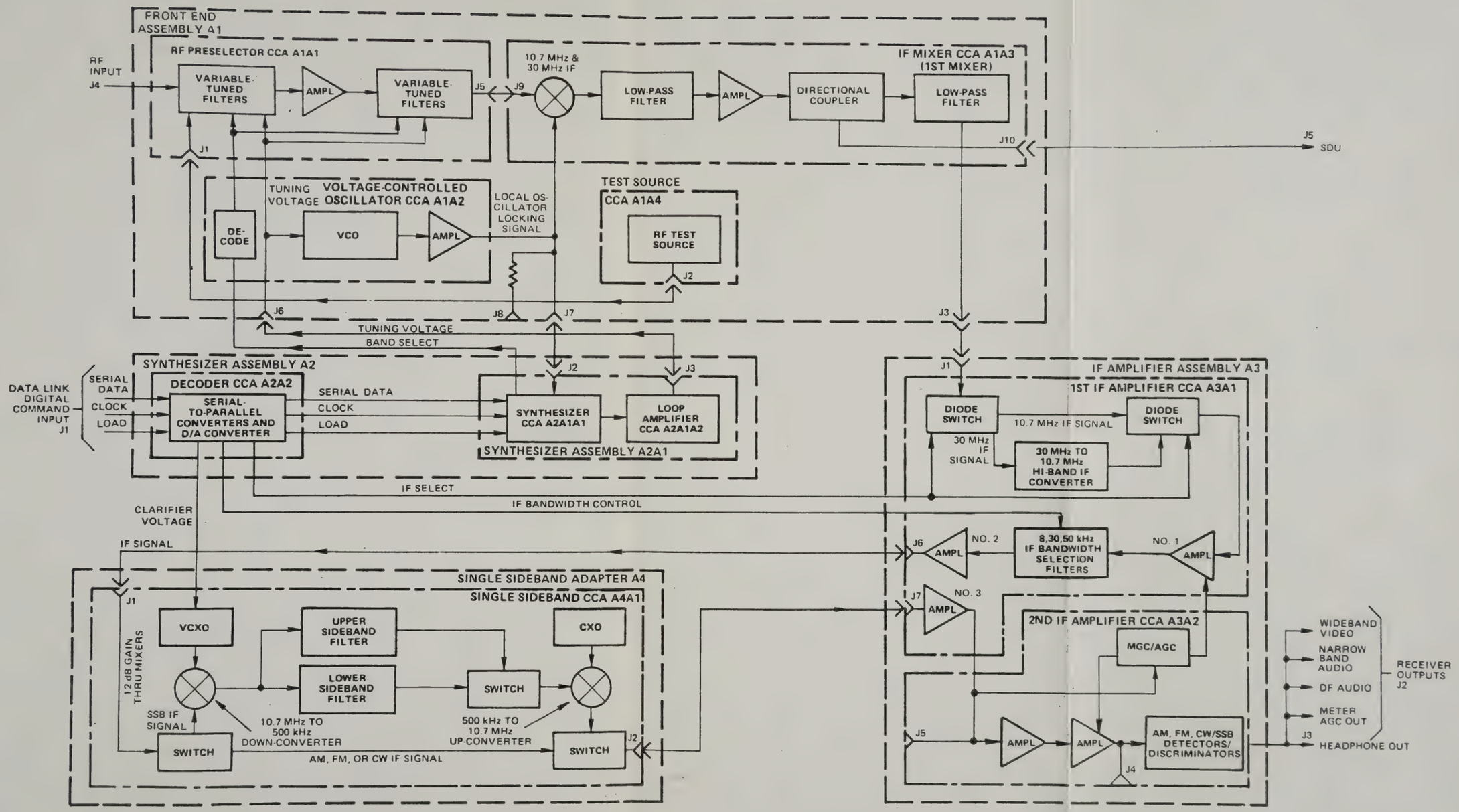
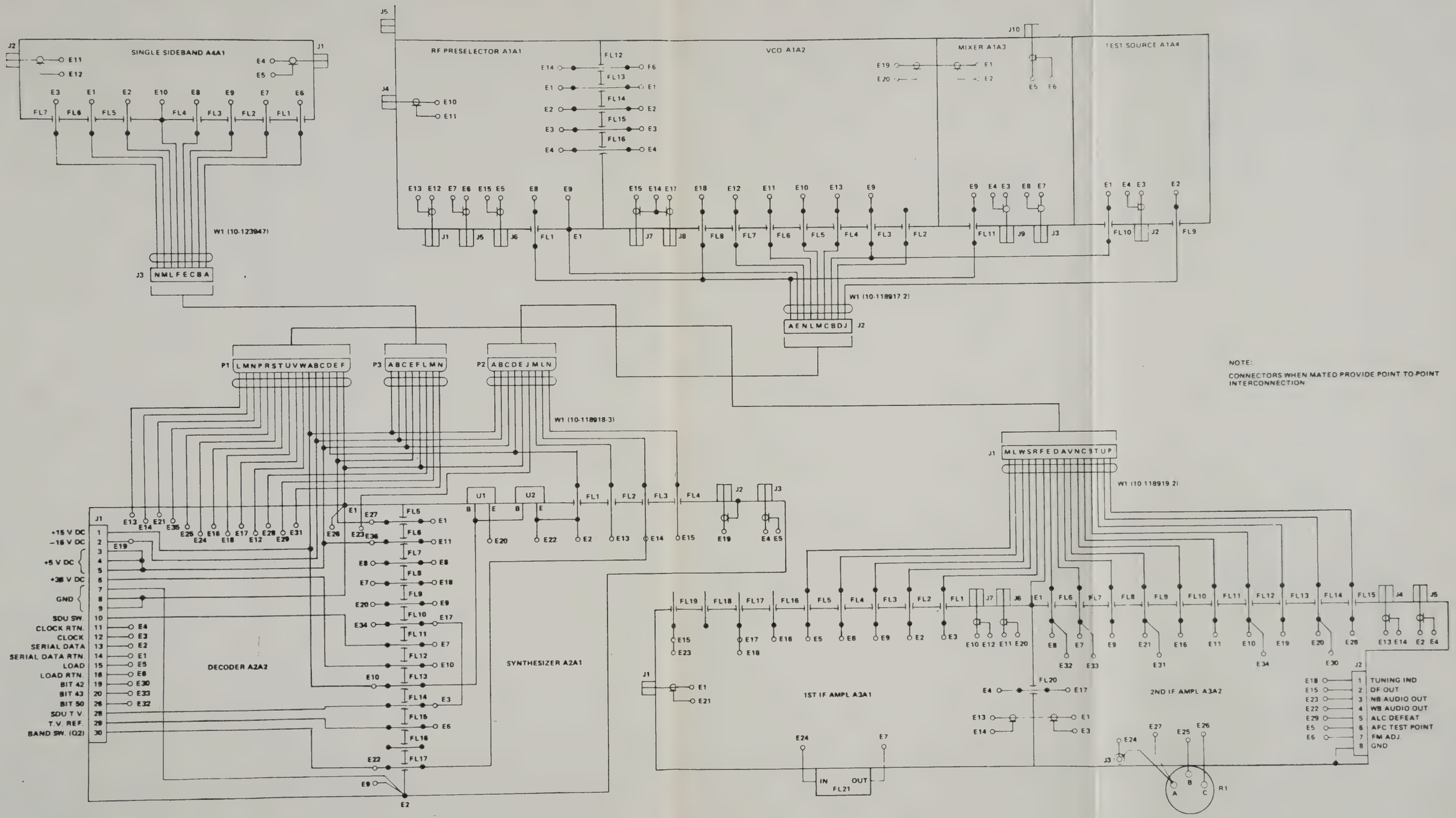


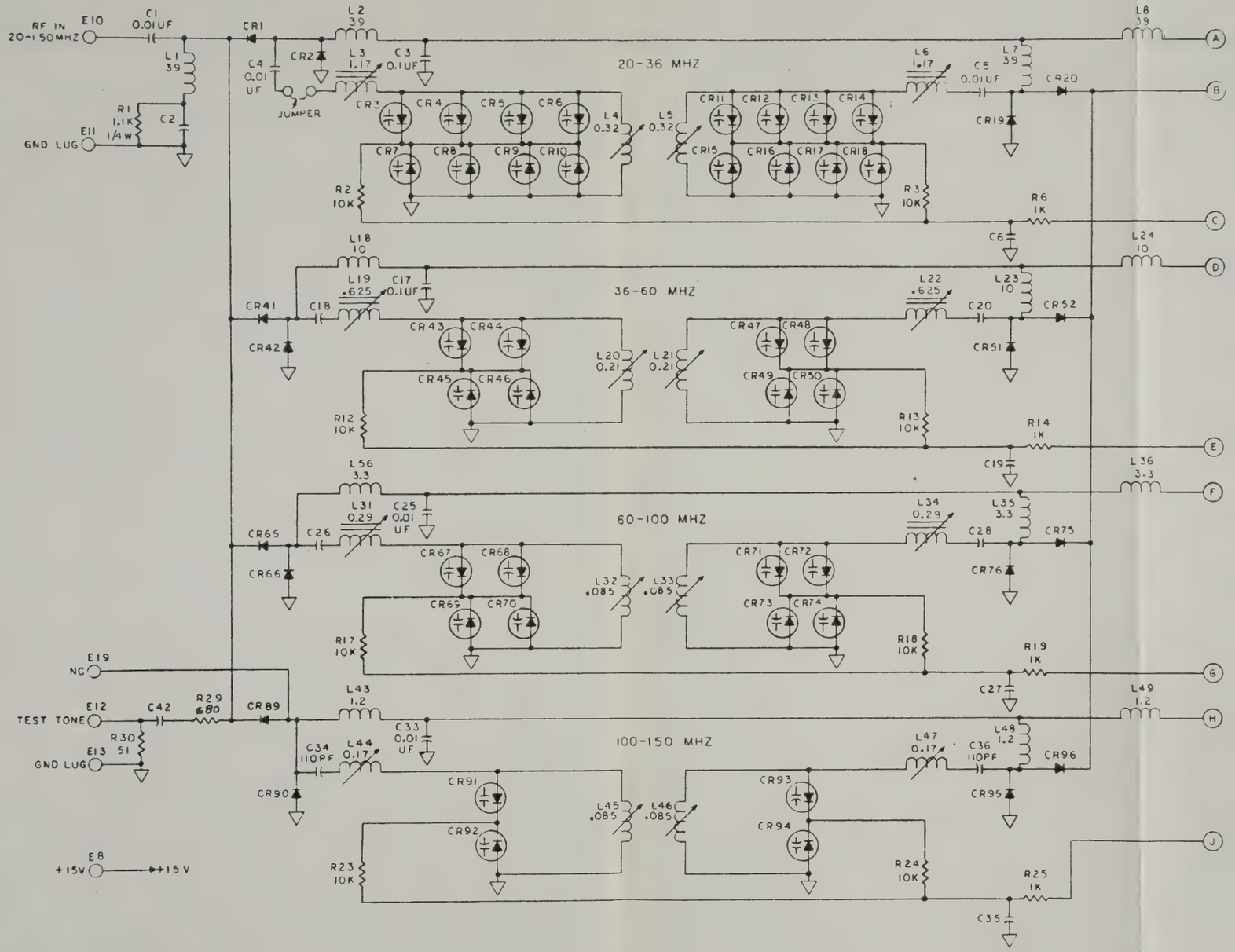
Figure FO-1. Radio Receiver R-5076/U Functional Block Diagram



NOTE:

CONNECTORS WHEN MATED PROVIDE POINT TO POINT INTERCONNECTION

Figure FO-2. Radio Receiver R-5076/U Wiring Diagram



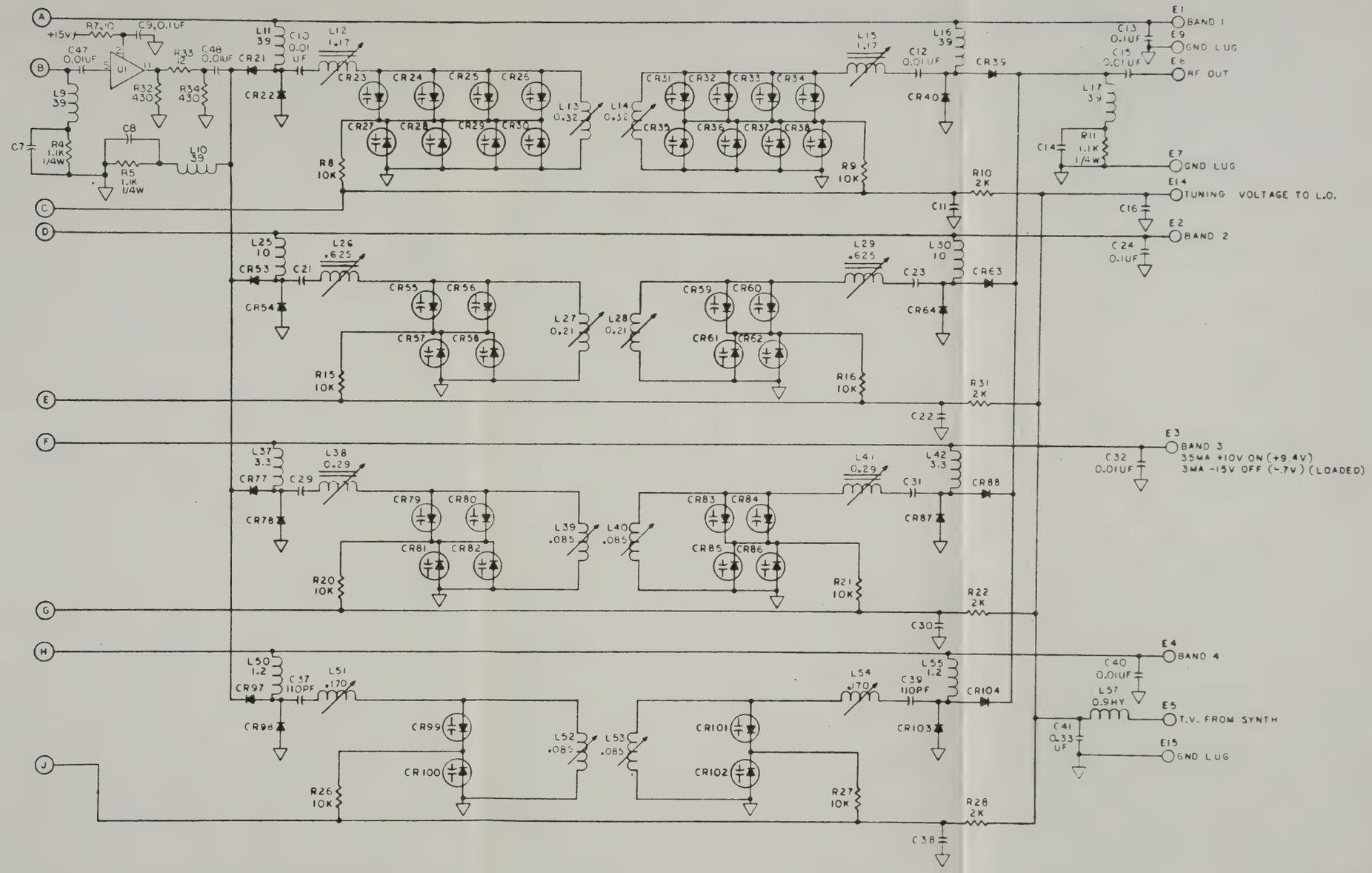
HIGHEST REFERENCE DESIGNATIONS						
C48	CR104	E19	L57	R34	U1	
REFERENCE DESIGNATIONS NOT USED						
C43		E16				
C44		E17				
C4-		E18				
C45						

NOTES: UNLESS OTHERWISE SPECIFIED

1. RESISTANCE VALUES ARE IN OHMS ± 5 %, 1/8 WATT
2. CAPACITANCE VALUES ARE 680 PF
3. INDUCTANCE VALUES IN UH
4. DIODES ARE HP5082-3188
5. VARACTORS ARE 100 PF.
6. DELETED

51-126521
REV B

Figure FO-3. RF Preselect CCA A1A1 Schematic Diagram (Sheet 1 of 2)



51-126521
REV B

Figure FO-3. RF Preselect CCA A1A1 Schematic Diagram (Sheet 2 of 2)

MICROCIRCUIT IDENT					
REF DES	TYPE	VCC	GND	(+V)	(-V)
U1,U3	AM-52	-	4,5	2	-
U2	5445	16	8	-	-
U4	AM101	-	-	-	-
U5	UA741	-	-	7	4
U6	LM120	-	1	-	-

HIGHEST REFERENCE DESIGNATIONS									
C44	CR20	DC1	E20	L2	Q11	R69	T4	U6	VR5
REFERENCE DESIGNATIONS NOT USED									
			E5		Q9				

RANGE	R48 [8]	R49 [9]	R50 [8]
ODB NOMINAL	N/U	JUMPER	N/U
10B	910Ω	6.2Ω	910Ω
20B	430Ω	12Ω	430Ω
30B	300Ω	18Ω	300Ω
40B	220Ω	24Ω	220Ω

RANGE	R51 [10]	R52 [11]	R53 [12]
10DB	1K	75Ω	1K
12DB NOMINAL	82Ω	91Ω	82Ω
14DB	75Ω	120Ω	75Ω

NOTES: UNLESS OTHERWISE SPECIFIED

1. RESISTANCE VALUES ARE IN OHMS ± 5 %, 1/8 WATT.
2. CAPACITANCE VALUES ARE IN PF.
3. DIODES ARE 1N4148.
4. TRANSISTORS ARE 2N2907.

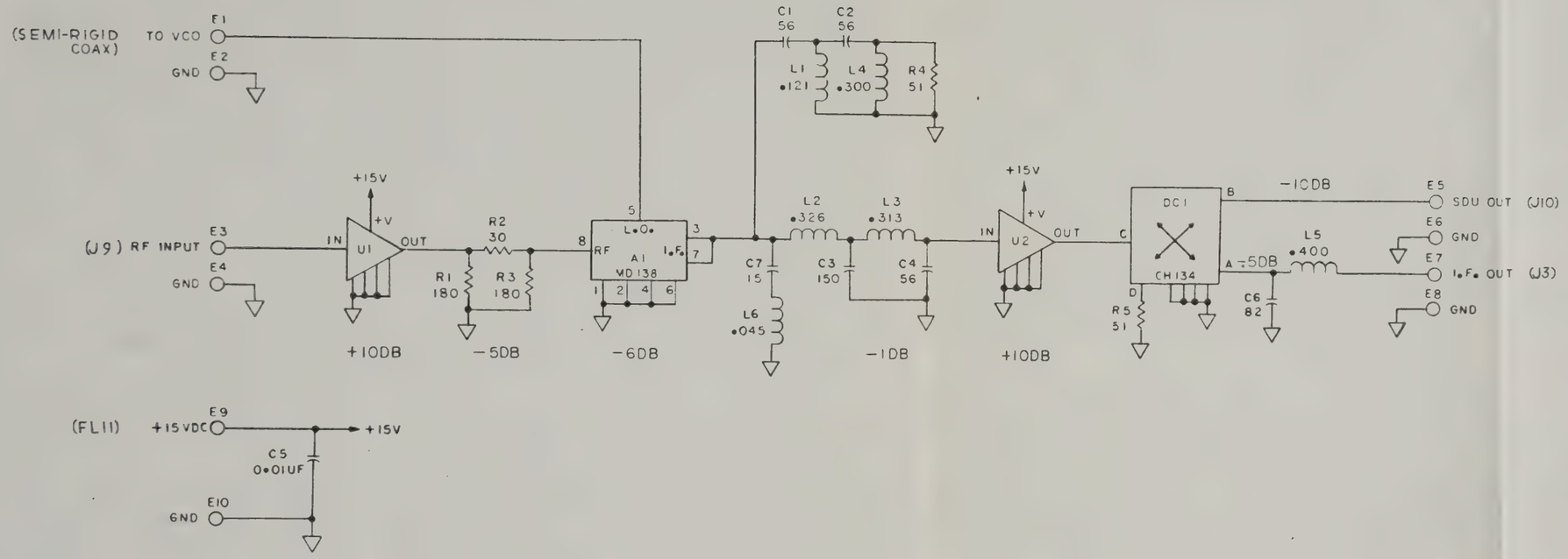
[5] REF PARTS KIT DWG 21-126767.

[6] REF PARTS KIT DWG 21-126768.
[7] 21-126769.
[8] 21-129557.
[9] 21-129558.
[10] 21-129559.
[11] REF PARTS KIT DWG 21-129560.

12. DELETED

51-126531 REV C

Figure FO-4. Local Oscillator CCA A1A2 Schematic Diagram



HIGHEST REFERENCE DESIGNATIONS						
A1	C7	DC1	E10	L6	R5	U2
REFERENCE DESIGNATIONS NOT USED						

MICROCIRCUIT IDENT					
REF DES	TYPE	VCC	GND	+V	-V
U1, U2	AM101	-	-	-	-

NOTES: UNLESS OTHERWISE SPECIFIED

1. RESISTANCE VALUES ARE IN OHMS ± 5 %, 1/8 WATT.
2. CAPACITANCE VALUES ARE IN PF.
3. INDUCTANCE VALUES ARE IN UH.
4. DELETED

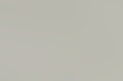
51-123751
REV A

Figure FO-5. First Mixer IF CCA A1A3 Schematic Diagram

HIGHEST REFERENCE DESIGNATIONS										
C28	CR3	A1	E7	Q2	R35	U2	VR1	Y1	L3	T2
REFERENCE DESIGNATIONS NOT USED										
C6,9, 11,25, 27					R8, 14 THRU 17					

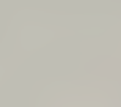
MICROCIRCUIT I.D.					
NO.	TYPE	VCC	GND	+V	-V
U1	741HC	—	—	7	4
U2	CA3028	—	—	—	—

A1



BOTTOM VIEW

U1, U2

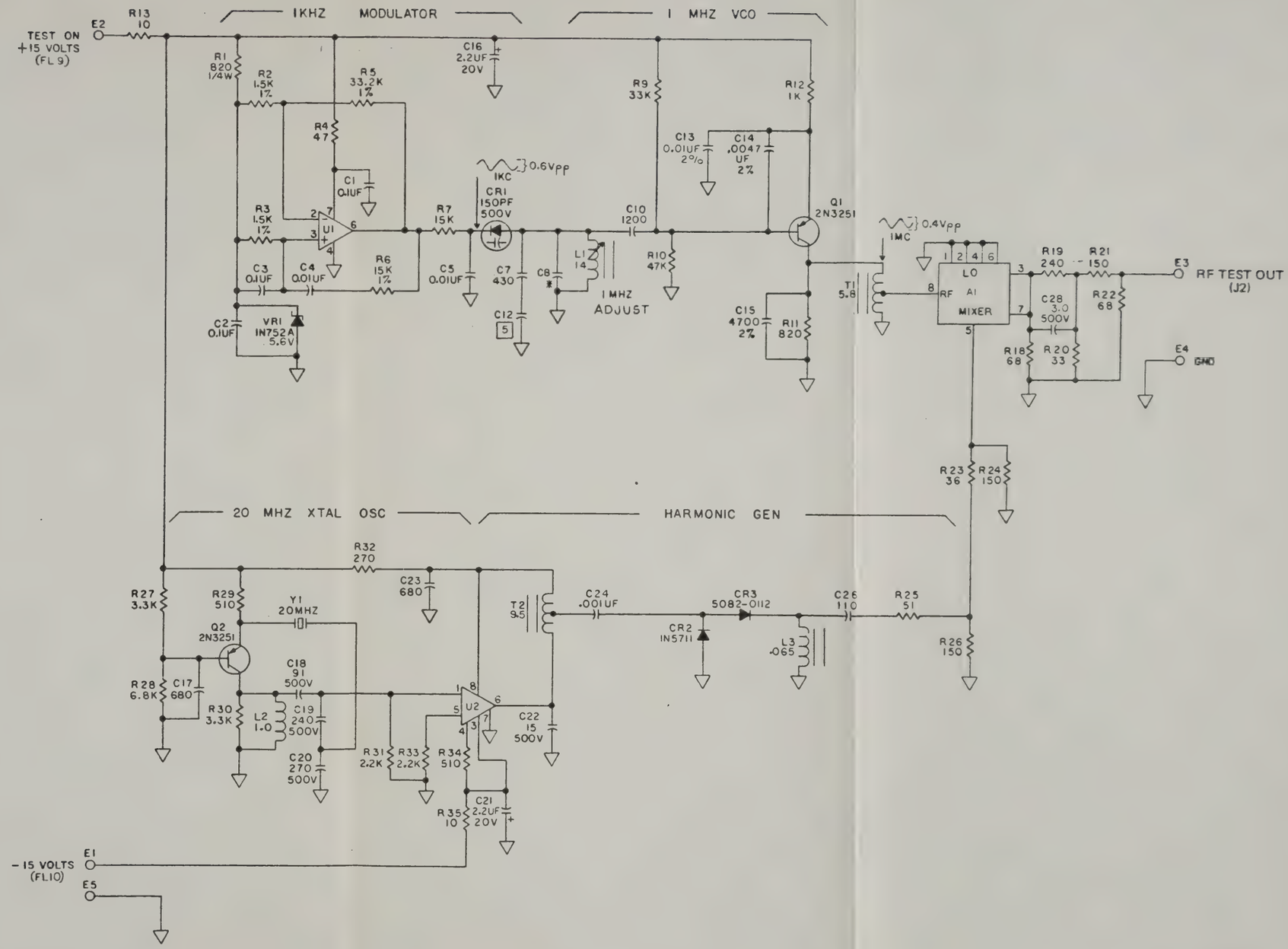


BOTTOM VIEW

NOTES: UNLESS OTHERWISE SPECIFIED

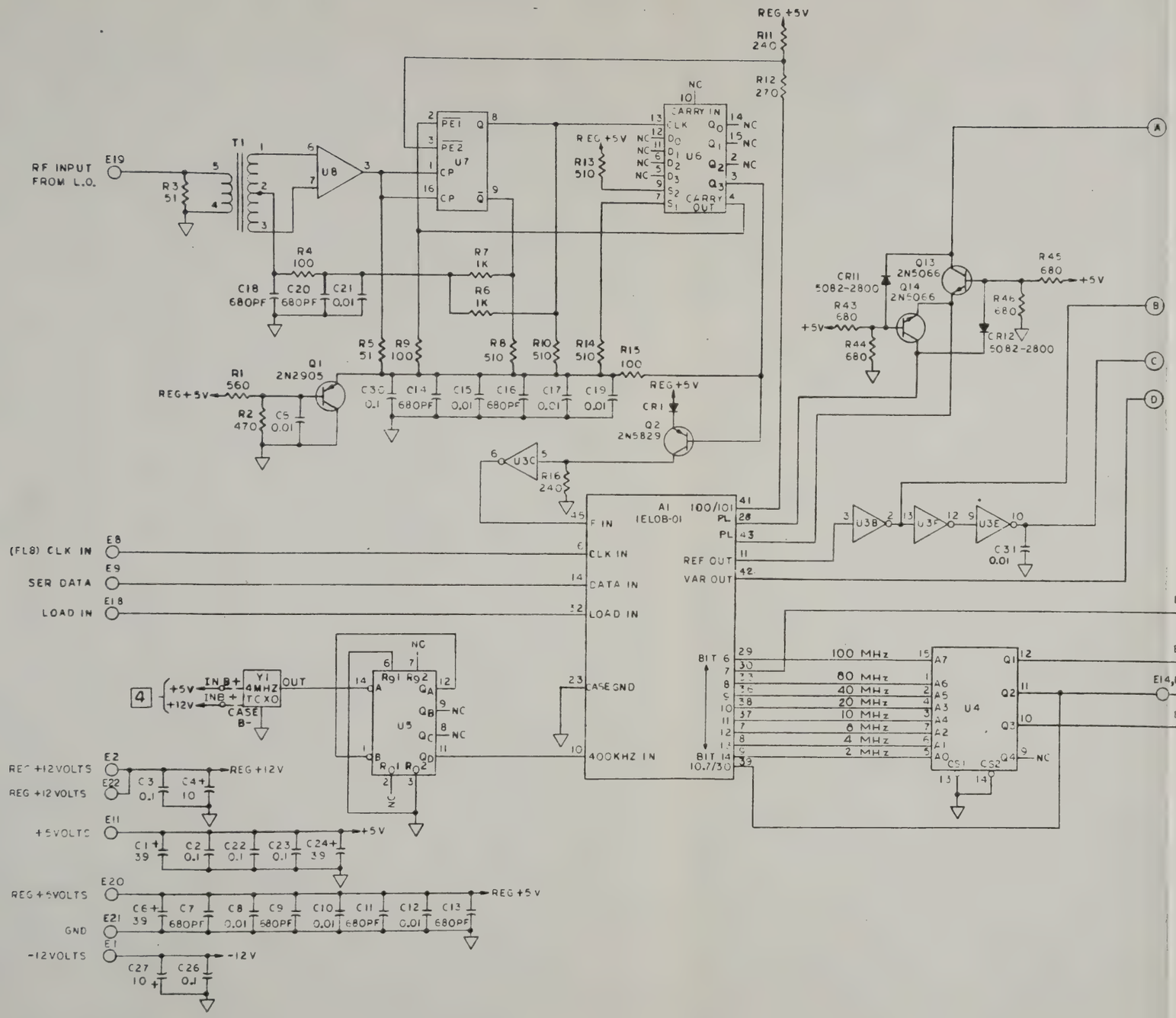
1. RESISTANCE VALUES ARE IN OHMS ± 5 %, 1/8 WATT.
2. CAPACITANCE VALUES ARE IN PF, 100V, 10%.
3. INDUCTANCE VALUES ARE IN UH.
4. * FACTORY SELECT. (1-12 PF)

[5] C12 NORMALLY JUMPERED.



51-118071
REV F

Figure FO-6. Test Source CCA A1A4 Schematic Diagram



HIGHEST REFERENCE DESIGNATIONS								
A2	C33	CR12	E20	Q12	R47	T1	U8	Y1	J8
REFERENCE DESIGNATIONS NOT USED								
	C32				R34				

MICROCIRCUIT IDENT			
REF DES	TYPE	VCC	GND
U1	54123	16	8
U2	4344	14	7
U3	5404	4	11
U4	1224	16	8
U5	5490	5	10
U6	10537	1,16	8
U7	8640	5	12
U8	1652	1,8	8
——	——	-	-
A1	1ELOB-01	5	26,19

NOTES: UNLESS OTHERWISE SPECIFIED

1. RESISTANCE VALUES ARE IN OHMS ± 5%, 1/8 WATT.
2. CAPACITANCE VALUES ARE IN UF.
3. DIODES ARE IN4148.
4. APPROPRIATE CONNECTION IS CONTROLLED BY ESL SCD 17-123620-1.

REV B
51-122481

Figure FO-7. Synthesizer CCA A2A1 Schematic Diagram (Sheet 1 of 2)

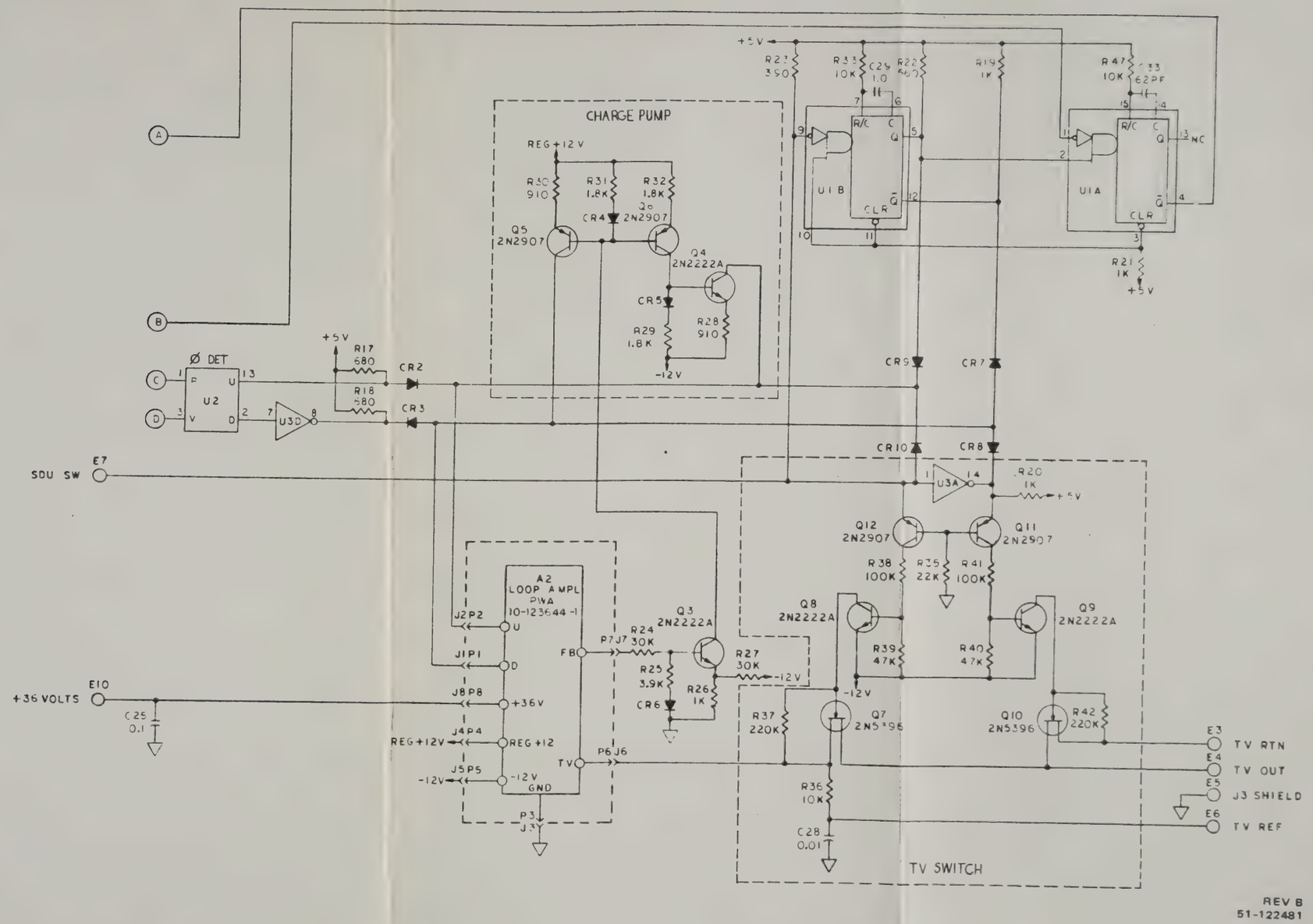
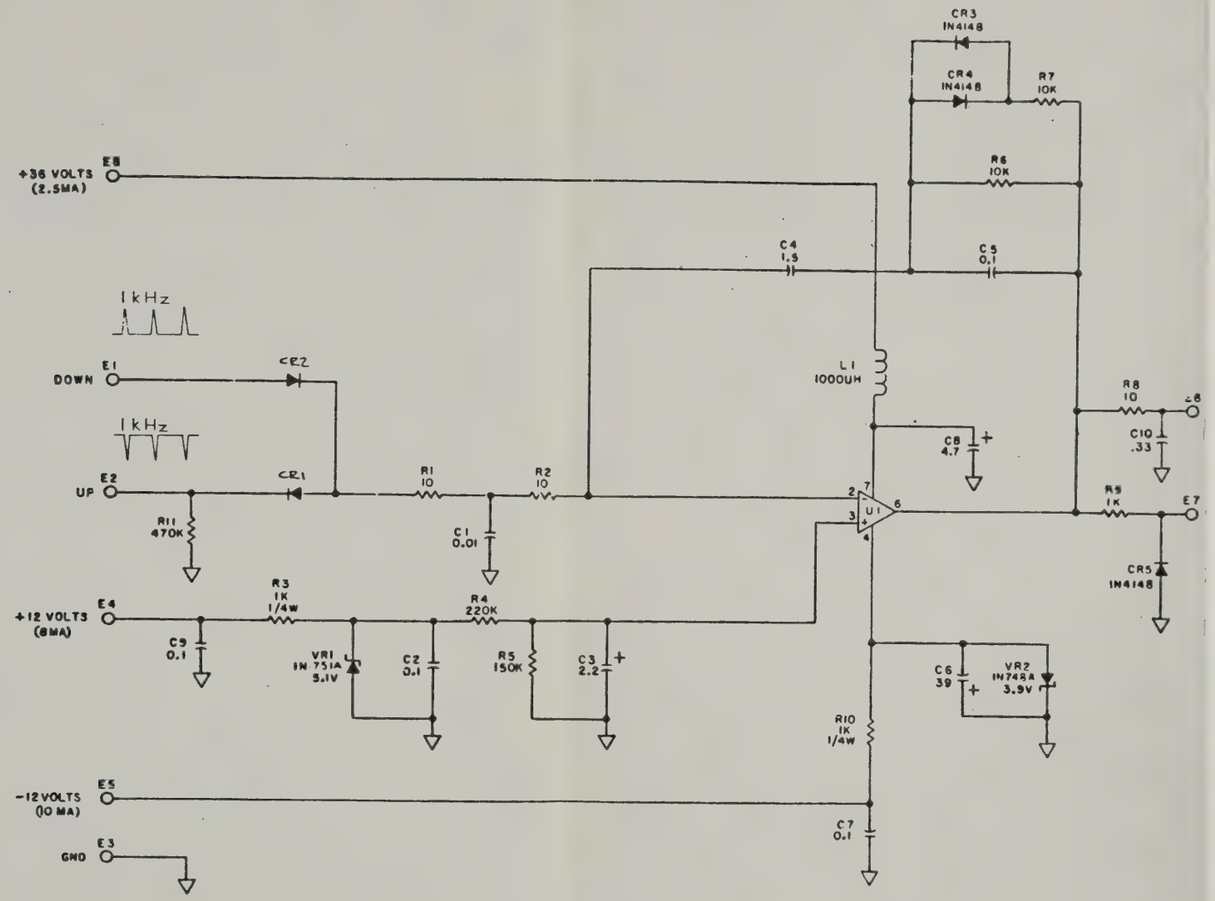


Figure FO-7. Synthesizer CCA A2A1 Schematic Diagram (Sheet 2 of 2)



HIGHEST REFERENCE DESIGNATIONS							
C10	CR5	E8	L1	R11	U1	VR2	
REFERENCE DESIGNATIONS NOT USED							

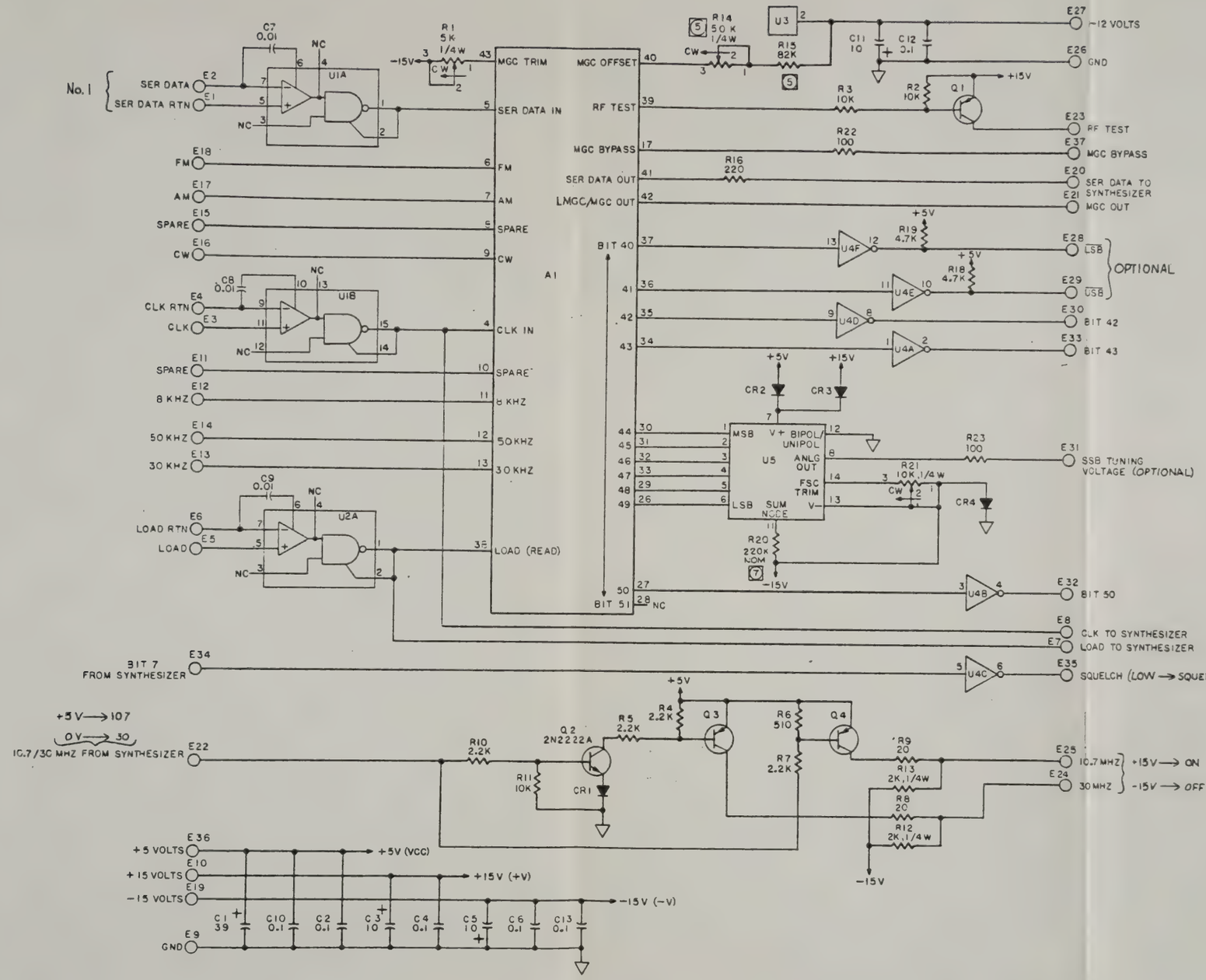
MICROCIRCUIT IDENT					
REF DES	TYPE	VCC	GND	+V	-V
U1	LM0022			7	4

NOTES: UNLESS OTHERWISE SPECIFIED

1. RESISTANCE VALUES ARE IN OHMS ± 5 %, 1/8 WATT
2. CAPACITANCE VALUES ARE IN UF.
3. PARTIAL REF DES ARE SHOWN, FOR COMPLETE DES, PREFIX WITH UNIT NO. AND SUBASSY DES.

51-123641
REV B

Figure FO-8. Loop Amplifier CCA A2A1A2 Schematic Diagram



HIGHEST REFERENCE DESIGNATIONS						
A1	C13	CR4	E37	J2	U5	R23
REFERENCE DESIGNATIONS NOT USED						
						R17

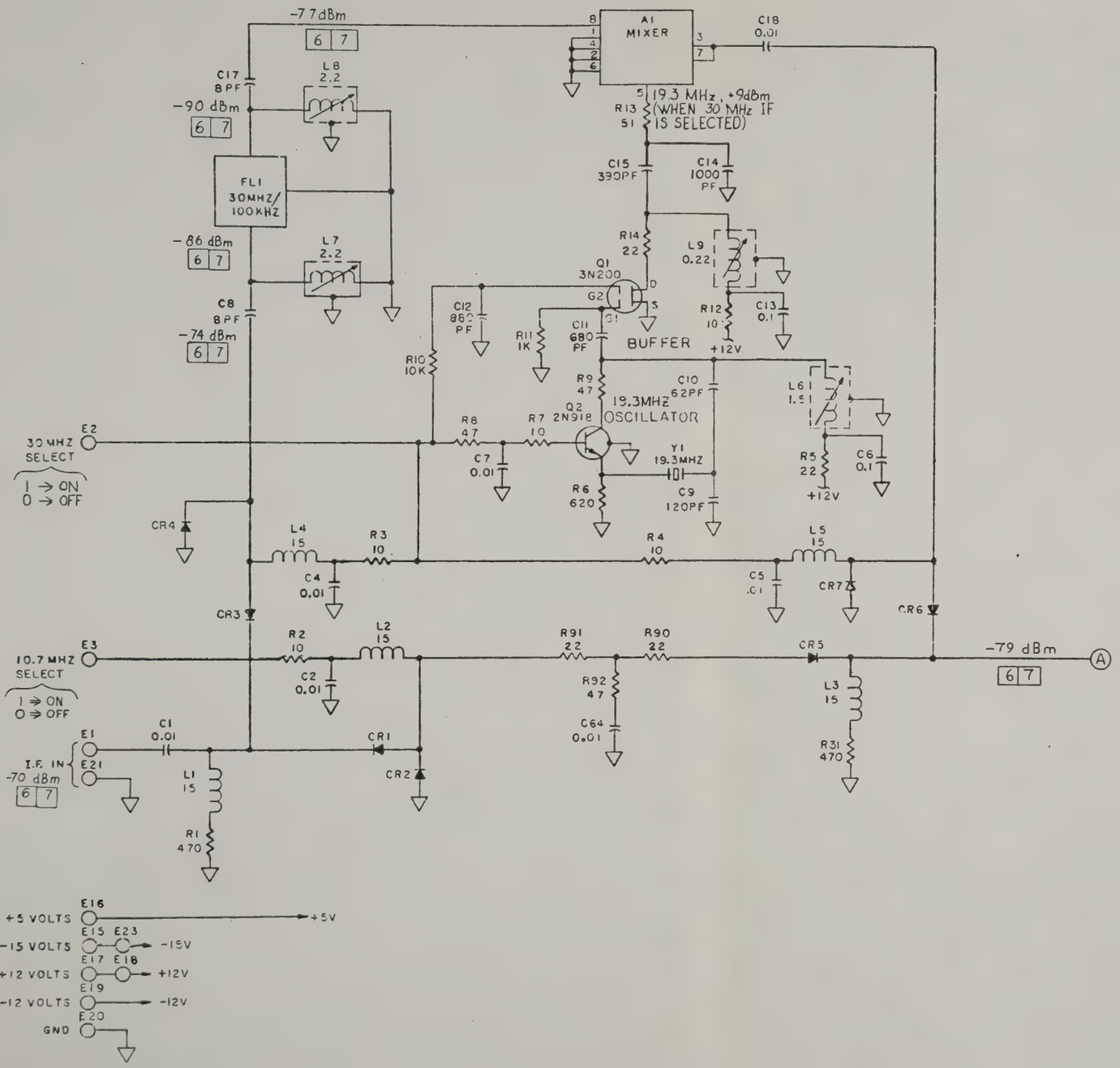
MICROCIRCUIT IDENT					
REF DES	TYPE	VCC	GND	+V	-V
U1,2	9615	16	18	-	-
U3	LM12CH	-	1	-	3
U4	5406	14	7	-	-
U5	DAC-01FP	-	9	7	13
A1	CAM-02	2,3	19,23	21,22	44-46

NOTES: UNLESS OTHERWISE SPECIFIED

1. RESISTANCE VALUES ARE IN OHMS ± 5%, 1/8 WATT.
2. CAPACITANCE VALUES ARE IN UF.
3. TRANSISTORS ARE 2N2907.
4. DIODES ARE IN4148.
5. SELECT AT FINAL TEST. INSTALL R14-50K & R15-82K OR LEAVE BOTH AS OPEN CIRCUIT. MGC RANGE TEST.
6. DELETED
7. R20 TO BE DETERMINED AT TEST. SEE PARTS KIT DRAWING 21-140016.

51-123761
REV C

Figure FO-9. Decoder CCA A2A2 Schematic Diagram



HIGHEST REFERENCE DESIGNATIONS
A1 C65 CR25 E23 FL3 L27 Q12 R32 T1
REFERENCE DESIGNATIONS NOT USED
C16
C62

MICROCIRCUIT IDENT			
REF DES	TYPE	+V	-V
U1	S5558T	8	4

NOTES: UNLESS OTHERWISE SPECIFIED

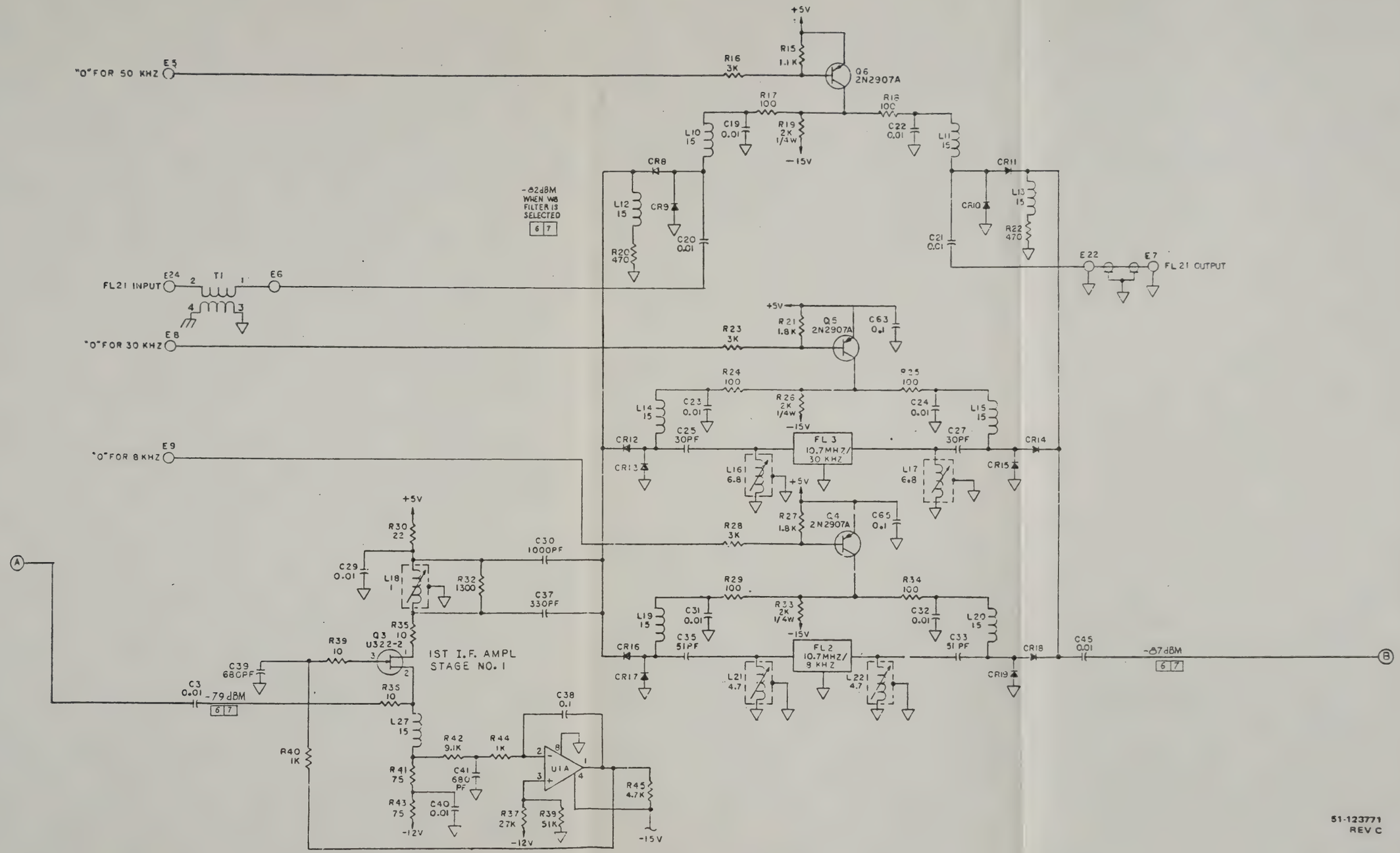
1. RESISTANCE VALUES ARE IN OHMS ± 5%, 1/8 WATT.
2. CAPACITANCE VALUES ARE IN UF.
3. INDUCTANCE VALUES ARE IN UH.
4. DIODES ARE 5082-3188.
5. DELETED

[6] RF LEVEL MEASUREMENTS MADE WITH RECEIVER IN MGC MODE WITH MAXIMUM GAIN SET.

[7] RF LEVELS MEASURED USING SPECTRUM ANALYZER (50Ω INPUT) AND COAX.

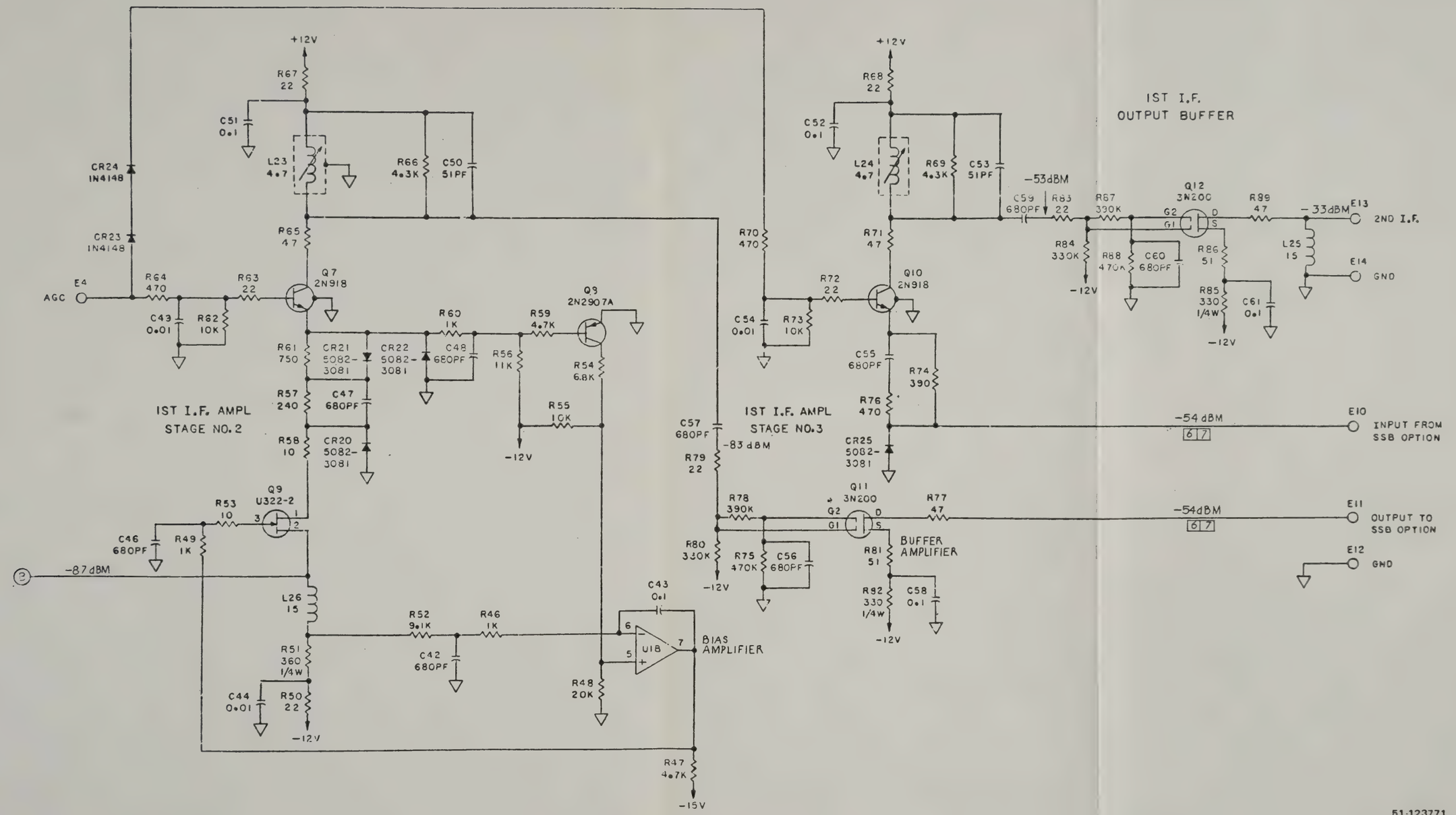
51-123771
REV C

Figure FO-10. First IF Amplifier/Detector CCA A3A1 Schematic Diagram (Sheet 1 of 3)



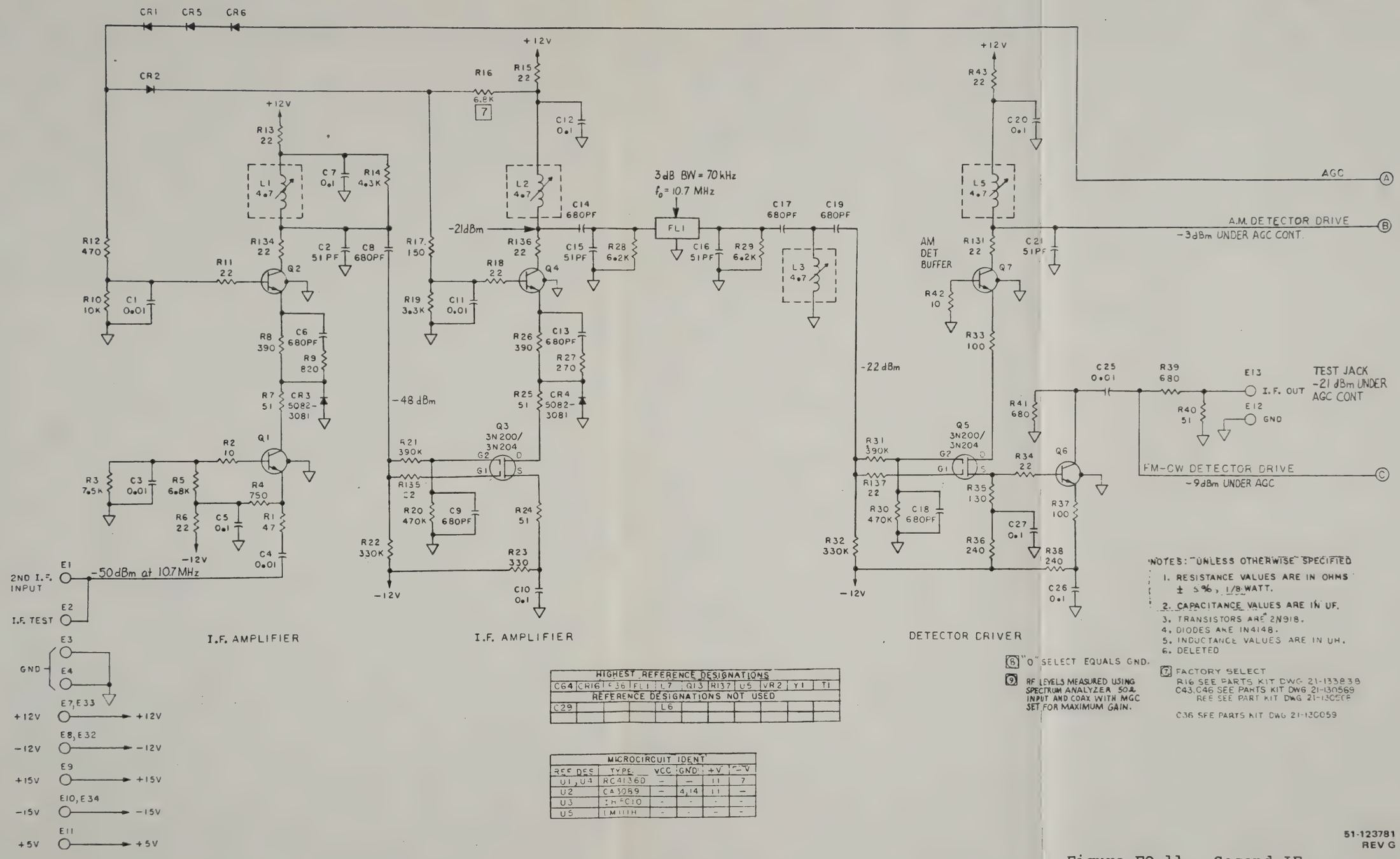
51-123771
REV C

Figure FO-10. First IF Amplifier/Detector CCA A3A1 Schematic Diagram (Sheet 2 of 3)



51-123771 REV C

Figure FO-10. First IF Amplifier/Detector CCA A3A1 Schematic Diagram (Sheet 3 of 3)



HIGHEST REFERENCE DESIGNATIONS										
CG4	CR16	C36	FL1	L7	Q13	R137	U5	VR2	Y1	T1
REFERENCE DESIGNATIONS NOT USED										
C29				L6						

MICROCIRCUIT IDENT					
REF DES	TYPE	VCC	GND	+V	-V
U1, U4	RC4136D	-	-	11	7
U2	CA3089	-	4,14	11	-
U3	1H5C10	-	-	-	-
U5	LM111H	-	-	-	-

NOTES: UNLESS OTHERWISE SPECIFIED

1. RESISTANCE VALUES ARE IN OHMS ± 5%, 1/8 WATT.
2. CAPACITANCE VALUES ARE IN UF.
3. TRANSISTORS ARE 2N918.
4. DIODES ARE IN4148.
5. INDUCTANCE VALUES ARE IN UH.
6. DELETED

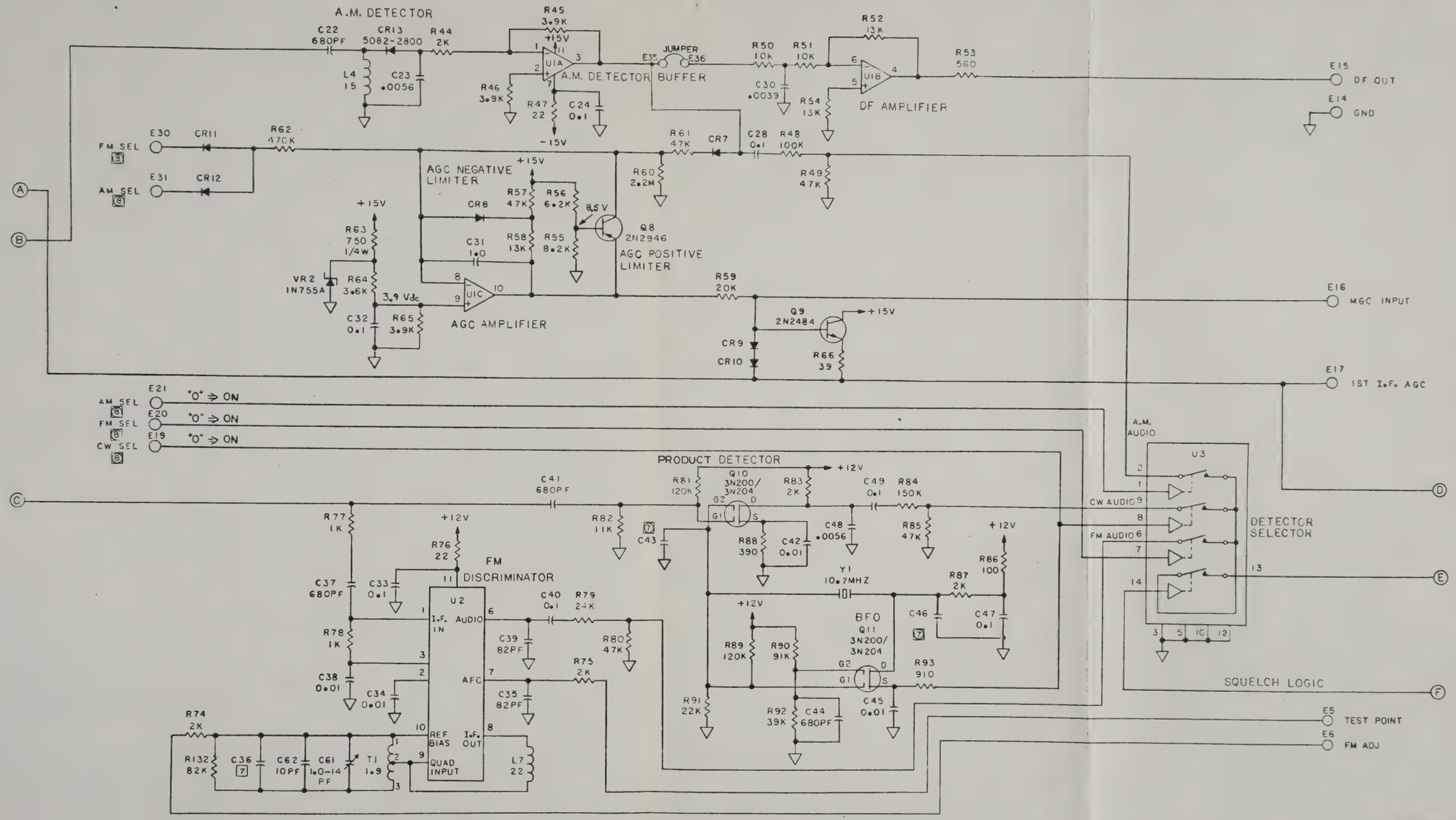
[6] "0" SELECT EQUALS GND.

[7] FACTORY SELECT
R16 SEE PARTS KIT DWG 21-133838
C43, C46 SEE PARTS KIT DWG 21-130569
R68 SEE PART KIT DWG 21-130568
C36 SEE PARTS KIT DWG 21-130059

[9] RF LEVELS MEASURED USING SPECTRUM ANALYZER 50Ω INPUT AND COAX WITH AGC SET FOR MAXIMUM GAIN.

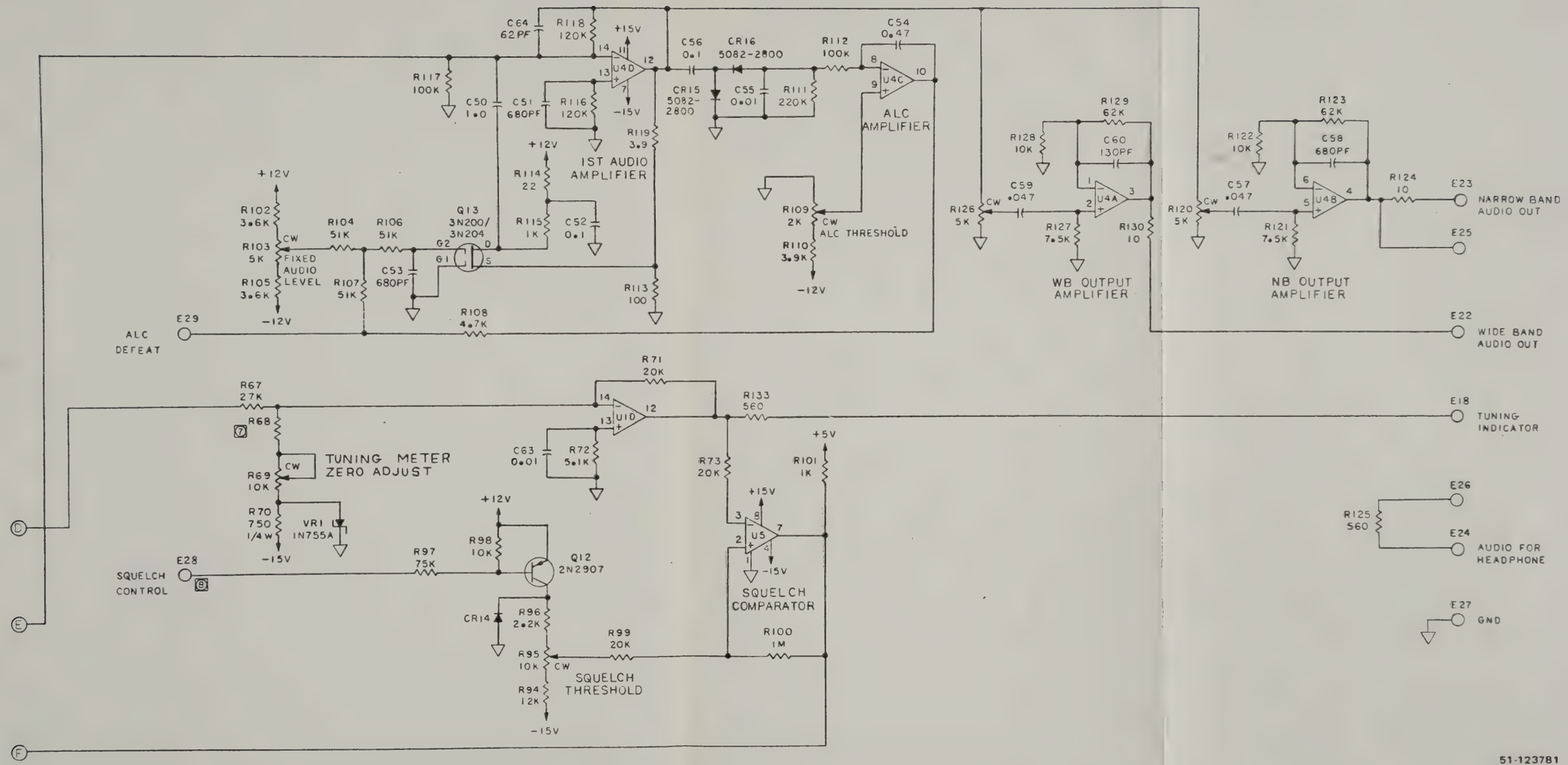
51-123781
REV G

Figure FO-11. Second IF Amplifier/Detector CCA A3A2 Schematic Diagram (Sheet 1 of 3)



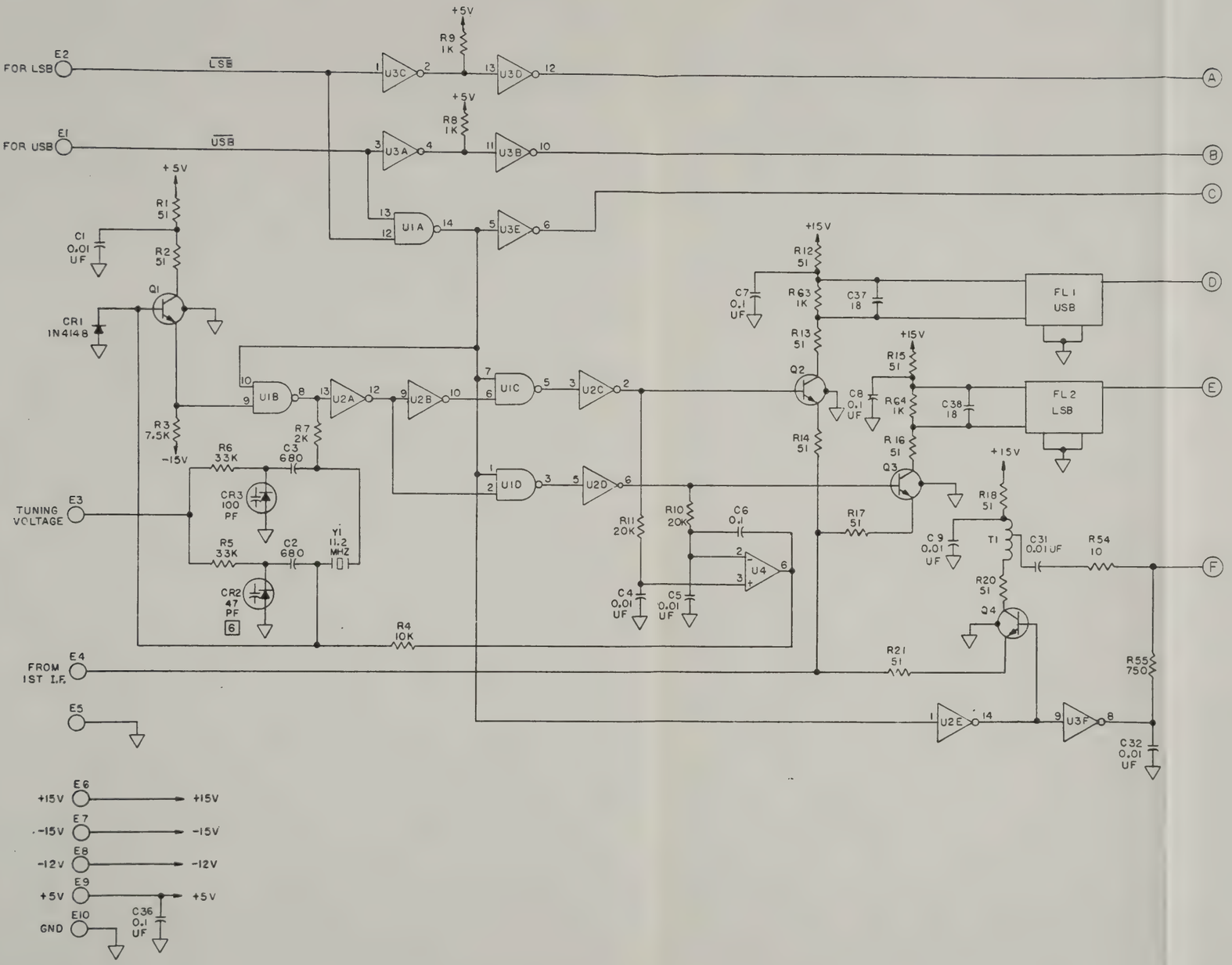
51-123781
REV G

Figure FO-11. Second IF Amplifier/Detector CCA A3A2 Schematic Diagram (Sheet 2 of 3)



51-123781
REV G

Figure FO-11. Second IF Amplifier/Detector CCA A3A2 Schematic Diagram (Sheet 3 of 3)



HIGHEST REFERENCE DESIGNATIONS									
T1	C38	CR3	E12	FL3	L2	Q10	R64	U4	Y2
REFERENCE DESIGNATIONS NOT USED									
							R19		

MICROCIRCUIT IDENT					
REF DES	TYPE	VCC	GND	+V	-V
U1	54H00W	4	11		
U2	54H04W	4	11		
U3	5406W	14	7		
U4	UA741			7	4

NOTES: UNLESS OTHERWISE SPECIFIED

1. RESISTANCE VALUES ARE IN OHMS ± 5%, 1/8 WATT
2. CAPACITANCE VALUES ARE IN PF
3. TRANSISTORS ARE 2N918
4. INDUCTORS VALUES ARE IN UH
5. DELETED
6. SEE PARTS KIT DWG 21-133839.
7. SEE PARTS KIT DWG 21-139827.

51-122921
Rev C

Figure FO-12. Single-Sideband CCA A4A1 Schematic Diagram (Sheet 1 of 4)

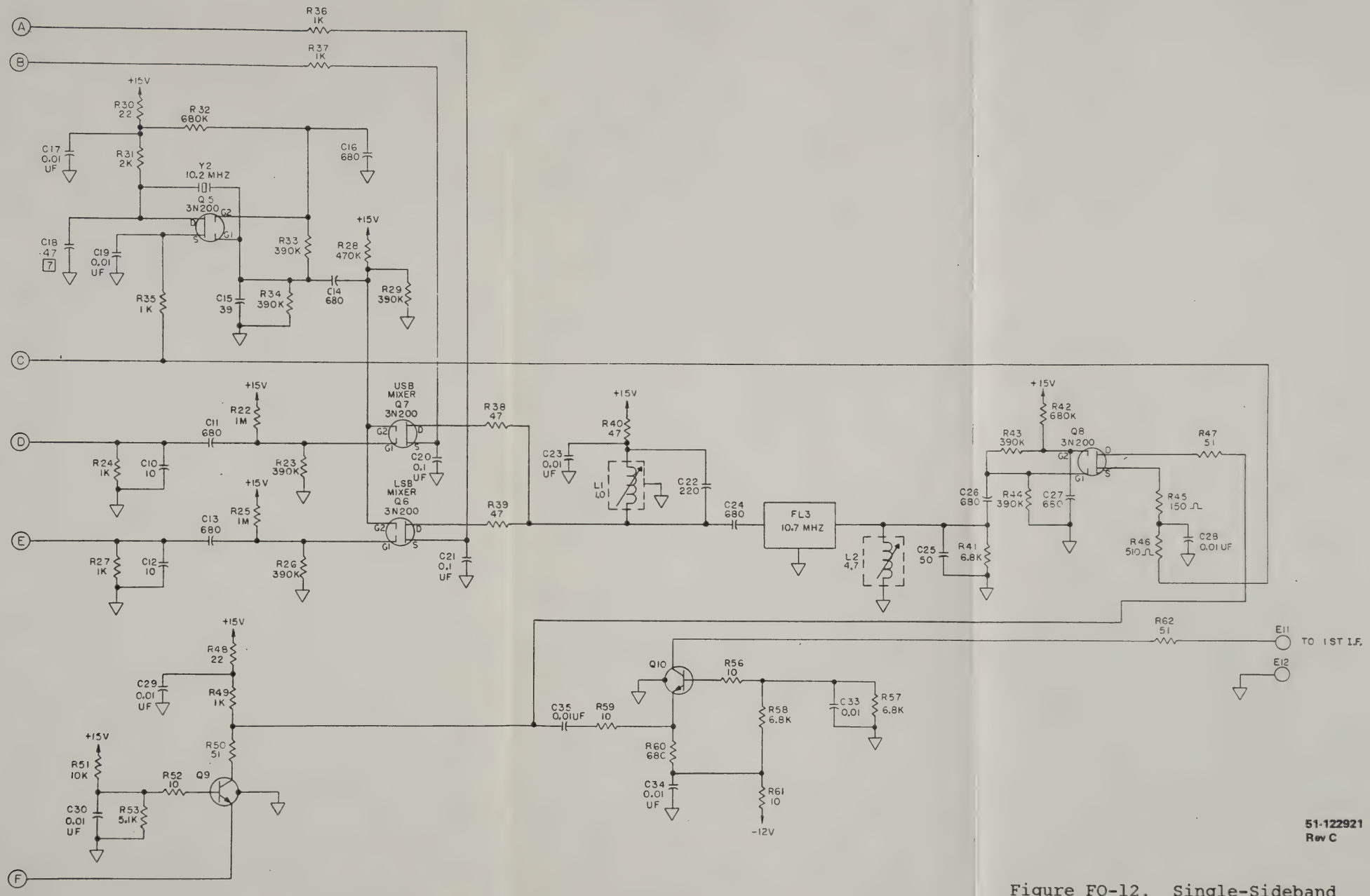
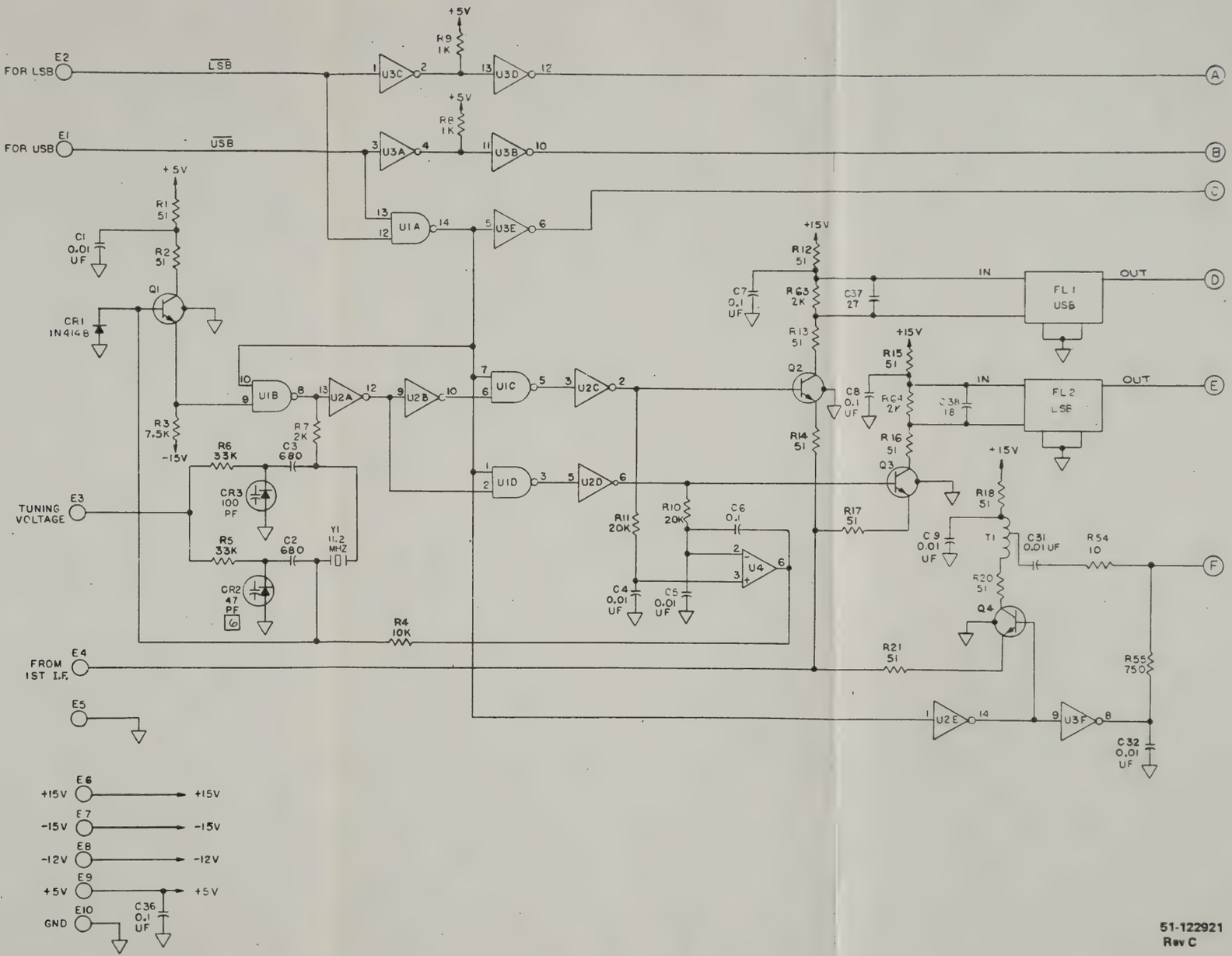
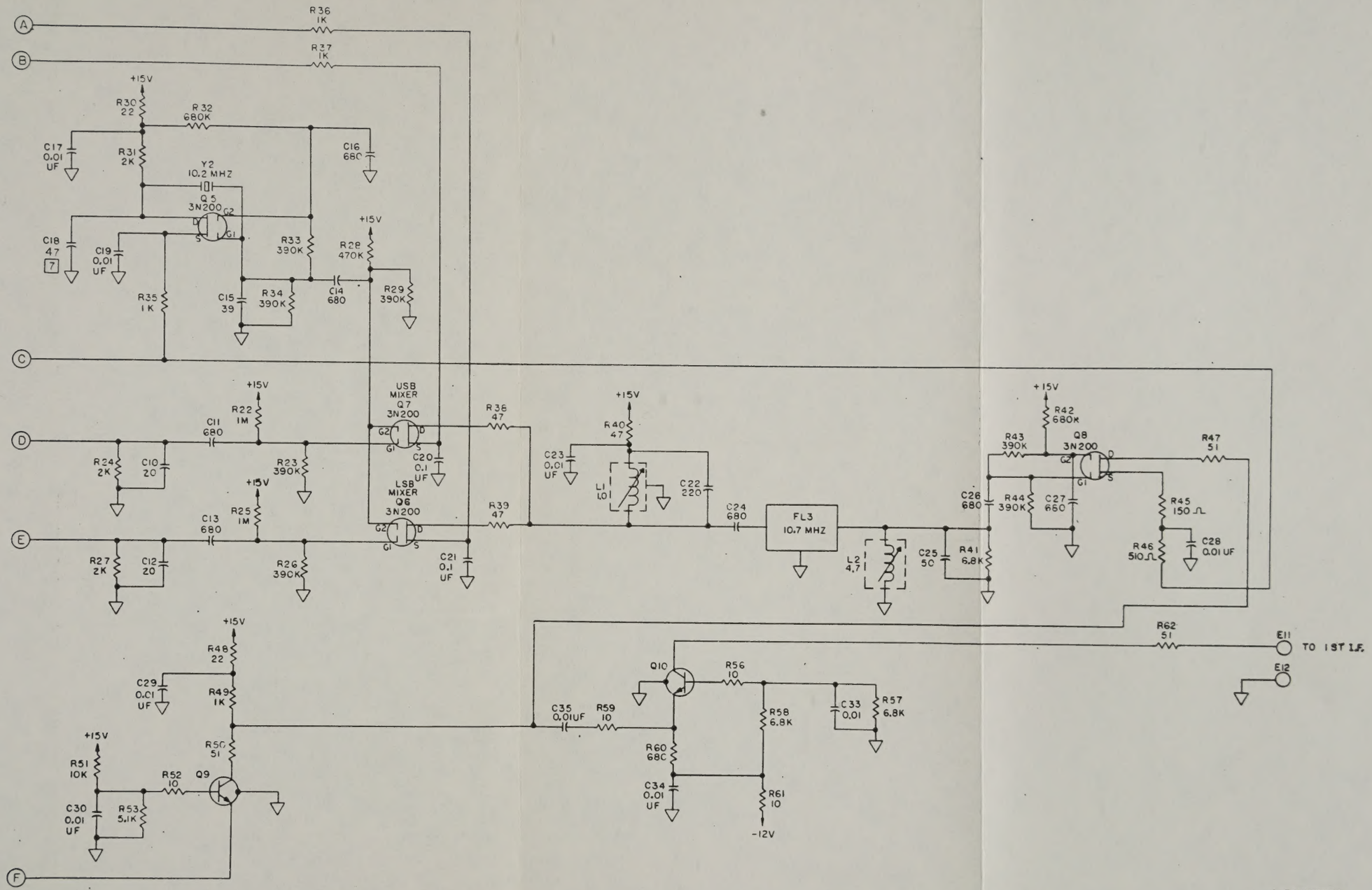


Figure FO-12. Single-Sideband CCA A4A1 Schematic Diagram (Sheet 2 of 4)



51-122921
Rev C

Figure FO-12. Single-Sideband CCA A4A1 Schematic Diagram (Sheet 3 of 4)



51-122921
Rev C

Figure FO-12. Single-Sideband CCA A4A1 Schematic Diagram (Sheet 4 of 4)